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LOGISTIC SUPPORT ANALYSIS STRATEGY

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LIST OF TERMS AND ACRONYMS

ACAT   Acquistion Category

CDR   Critical Design Review
COSAL   Consolidated Shipboard Allowance List

DID   Data Item Description

FMECA   Failure Modes Effects and Criticality Analysis

ILS   Integrated Logistic Support
ILSP   Integrated Logistic Support Plan

LSA   Logistic Support Analysis
LSAR   Logistic Support Analysis Record

MIS   Management Information System
MP&T   Manpower, Personnel, & Training

NAVSEA   Naval Sea Systems Command

NCSC   Naval Coastal Systems Center

OJT   On-The-Job Training

PHS&T   Packaging, Handling, Storage and Transportation
PMS   Planned Maintenance System
PPL   Provisioning Parts List

RIL   Repairable Items List
R,M & QA   Reliability, Maintainability, and Quality
                    Assurance
RMS   Remote Minehunting System
RMSTDC   RMS Technical Data Center

S&TE   Support and Test Equipment
SM&R   Sources, Maintenance level, Recoverability
SPCC   Ships Parts Control Center
SUBDEVGRUONE   Submarine Development Group One

LIST OF RMS PROGRAM DOCUMENTS

The following documents form the basis for this RMS Logistic Support Analysis Plan:

Operational Requirement for Remote Minehunting System -

Test and Evaluation Master Plan -

RMS Quality Assurance Program Plan -

RMS System Safety Program Plan -

RMS Reliability and Maintainability Program Plan -

RMS System Concept -

RMS Standalone Documents
      Test and Evaluation Master Plan
      Program Cost Estimate
      Independent Cost Estimate
      Cost & Operational Effectiveness Analysis
      Acquisition Program Baseline
      Manpower Estimate Report
      Waivers/Reports
Integrated Program Summary
      Execution Status
      Threat Highlights-Shortfalls of Existing Systems
      Alternatives Assessed & Results
      Most Promising Alternatives and Rationale
      Acquisition Strategy
      Cost Drivers & Major Tradeoffs
      Risk Assessments & Plans to Reduce Risk
      Recommendations
      Appendices
        A. Program Structure
        B. Program Life-Cycle Cost Estimate Summary
        C. Acquisition Strategy Report
        D. Risk Assessment
        E. Environmental Analysis
        F. Affordability Assessment
        G. Cooperative Opportunities Document

LIST OF ILS GUIDANCE DOCUMENTS

DoD Instruction 5000.1	Defense Acquisition Management and Procedures
NAVSEAINST 5000.39	Acquisition and Management of Integrated Logistic Support for Systems and Equipment
S0300-BD-PRO-030 (Vol III, Appendix (E)	ILS Procecures Manual
MIL-STD-470	Maintainability Program Requirements
MIL-STD-471	Maintainability Verification/ Demonstration/Evaluation
MIL-STD-1388-1A	Logistic Support Analysis
MIL-STD-1388-2B	DoD Requirements for a LSA Record

Foreword

This document has been prepared by the Naval Coastal Systems Center, Remote Minehunting System project. It represents an initial, tailored implementation of the Logisitic Support Analysis (LSA) and Logistic Support Analysis Record (LSAR) requirements for the RMS program. This document is inteneded to be dynamic. The RMS system is in its initial development. This document will be updated as that direction and guidance becomes available.

Remote Minehunting System
LSA Strategy

1.0   INTRODUCTION

Logistic Support Analysis (LSA) is a systematic approach to the design cf supportable, affordable systems and equipments. It employes a defined set of analyses and documentation requirements that are used to identify and isolate those elements of a hardware or support system design which have the gratest or most critical impact on system supportagility. Supportability, in this context, is the relationship between hardware and support system characteristics as they relate to the operational availability and affordability (Life Cycle Cost) of the RMS.

The LSA process is made up of two main components. The first is the technical analyses or tasks which are used to: (1) Define system requirements and constraints; (2) Identify support characteristics of a hardware design, and (3) Design the optimum support system associated with an acceptable design. The second component of the LSA process is the capture of the resulting documentation. This documentation process, called the Logistic Support Analysis Record (LSAR), is a structured approach to the capture, storage, and use of information developed through the conduct of the LSA Tasks. MIL-STD-1388-1A defines the analysis tasks of an LSA Program. MIL-STD-1388-2A establishes the attendant LSAR documentation requirements. To be cost-effective the LSA/LSAR must be tailored to the unique needs and considerations of an development program.

This LSA Strategy reflects a tailored implementation of the basic standards for the RMS and contains the specific tasks to be conducted and the procedures to be used for documenting their results in the LSAR.

1.1   PURPOSE

The RMS LSA Program is designed to establish a realistic balance between RMS hardware and support system design characteristics to meet system operational and affordability requirements and constraints. The RMS LSA Program is based on the tailored implementation of MIL-STD-1388-1A and -2A as reflected in the NAVSEA Logisitic Support Analysis Implementation Guide.

LSA is a dynamic process requiring support from a diverserse set of engineering and functional support disciplines. The process has been tailored to focus NCSC LSA resources on those aspecrts of the emerging hardware and support system designs which offer the greatest opportunity for significant supportability improvement and the best return on investment. The program documentation, captured in the LSAR, will reflect the Program decisions based upon the results of the analytical program.

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The NCSC RMS LSA Program is positioned within the RMS System Engineering organization so as to be an active and contributing participant in the system level analyses and decisions which potentially impact system availability, logistic support and affordability. Rigorous integration of common analysis and documentation requirements within the supportability organization has resulted in an LSA Program that is cost effective and focused, but sufficiently flexible to adapt to the changing needs of the RMS.

This LSA Strategy has been prepared by NCSC to ensure that the LSA Program activities are conducted in a disciplined and timely manner and are technically consistent with RMS goals and objectives. The strategy establishes common procedures for performing LSA analytical tasks and for preparation of the LSAR documentation.

The strategy will be updated throughout the program to reflect the most technically responsive and cost effective approach to the implementation of LSA for RMS.

1.2 SCOPE.

This plan is applicable to NCSC, other activities involved in RMS development, subcontractors and vendors responsible for accomplishment of the RMS LSA Program. The procedures contained in this plan are applicable to the RMS equipment to include all subsystems and equipments. The LSA Tasks will be performed iteratively concurrent with the evolution of the RMS hardware and support system designs. The LSAR will be updated continuously to reflect the most current information available. The LSAR database will serve as the source documentation for development of all deliverable logistics products.

1.3 OBJECTIVES.

The RMS LSA Program unites the Integrated Logistic Support (ILS) Program with the Design and Systems Engineering efforts from program initiation through operational support of the deployed RMS. The blending of performance, engineering and logistic support development activities ensures that:

a.   Supportability considerations influence system requirements and designs.

b.   Support requirements are optimally related to the C&TS design and to each other.

c.   All support resuource requirements are identified and quantified.

d.   Logistics products reflect hardware and support system design characteristics.

e.   RMS is supportable and affordable throughout the operational life.

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2.0 RMS SYSTEM DESCRIPTION

The U.S. Navy has the requirement to perform Remote Minehunting operations to include detecting, and localizing mines (and mine like objects). Capable of providing a rapid response capability to requirements of U.S. Navy Battle Groups, the RMS will provide a sustained forward presence in operational areas, egress and exit lanes, will ensure safe operations in economic, logistic shipping and port locations, and maintain open operations of critical ports.

Still in Concept Formulation, the RMS (Figure 2-1) is envisioned as an autonamous system designed for real-time operation. Further information regarding performance requirements and design considerations are available in the Remote Minehunting System Technical Operational Requirements (TOR) dated _____ available upon request from the Naval Coastal Systems Center (Code 3120).

The RMS is an Acquisition Category (ACAT) ____ project being developed in response to the requirements of Navy Operational Requirement (OR) _____. The RMS is being designed and built at NCSC, Panama City Florida. Upon completion, the RMS and its support package will be turned over for zest and evaluation activities by the _____. Following an approximate _____ month evaluation period, _____ will assume responsibility for RMS operations and maintenance.

The RMS is a unique system designed to operate on Fleet ships and crafts of opportunity and to operate independently of platform power. The objective of this project is to develop an RMS system capable of worldwide operations; therefore, a logistic support system tailored to a team operations and maintenance concept is a primary consideration. Required characteristics are still in development and will be provided in Table 2-1 upon their becoming available.

2.1 RMS SUBSYSTEMS.

The RMS is comprised of seven functional subsystems. The following is a brief description of those subsystems. More in- depth information is available in the RMS Technical Operational Requirements dated

2.1.1   SENSOR VEHICLE SUBSYSTEM
2.2.2   TOWING VEHICLE SUBSYSTEM
2.1.3   CONTROL STATION SUBSYSTEM
2.1.4   DEPLOYMENT AND RECOVERY SUBSYSTEM
2.1.5   AUXILIARY EQUIPMENT SUBSYSTEM

Figure 2-1
RMS System Concept

3.0 LSA PROGRAM MANAGEMENT

LSA Program Management responsibility for the NCSC RMS LSA Program is vested in the System Effectiveness/Integrated Logistic Support (SE/ILS) organization located in the NCSC RMS Project Office, Panama City Beach, Florida. The organizational structure is as depicted in Figure 3-1

3.1 RMS PROGRAM MANAGER

Program Management responsibility for the RMS system is vested in the RMS Program Manager, NCSC Code 3120. The RMS Program Manger is responsible for overall program planning, programming, budgeting and direction of the activities required to transform the operational requirement into the design specifications and subsequently into the RMS System.

3.2 SYSTEM EFFECTIVENESS/INTEGRATED LOGISTIC SUPPORT RESPONSIBILITIES

The NCSC RMS System Effectiveness/Integrated Logisitic Support (ILS/SE) organization is responsible for the management and control and execution of all RMS LSA activities. NCSC Code 3120 (LSA) provides technical support to the RMS SE/ILS Manager in the performance of the RMS LSA Program and in the management of government and vendor LSA activities. The SE/ILS orgranization is responsible for development and maintenance of the RMS LSAR database to include the incorporation of all vendor LSAR data.

Figure 3-1
RMS LSA Program Organization

4.0 LSA PROGRAM DESCRIPTION

Effective integration of ILS planning and development activities involves both horizontal and vertical integration. The LSA process provides the technical vehicle for implementation of this Integrated approach. Horizontally, the LSA program has been integrated with the ILS and other supportability-related program elements. Vertical integration amoung the ILS functional disciplines likewise has been implemented to coordinate support system development activities.

RMS LSA program activities for achieving maximum RMS system supportability at minimum risk are based upon the use of a common set of operating procedures. These procedures reflect the integration of RMS Design, Systems Engineering and ILS activities. They elemeinate duplicate and redundant activities and documentation, improve the coordination and consistancy of functional element activities and enhance the quality of the support products.

Us of these procedures will ensure the timely identification of supportability and manpower and personnel issues concurrent with the formulation of design concepts and alternatives. Through continuous involvement in the maturation of the design, NCSC RMS SE/ILS organization is able to: (1) Establish design goals and objectives derived from analysis of predecessor systems and equipments; (2) Evaluate the adequacy of proposed design solutions, and; (3) Identify opportunities for further improvement of the emerging hardware and support system concepts and designs.

Rigorous adherence to the established integration procedures is a fundamental element of a total quality approach and is an essential aspect of the NCSC concurrent engineering approach to the RMS development. Each of the individual SE/ILS organization elements have specific program responsibilities as defined in the program management plans. These responsibilities are described in terms of detailed technical, analytical and documentatiuon requirements whose accomplishment support the overall program objectives. When the total set of functional requireemnts is outlined it is readily apparent that there is significant commonality or overlap betwen the needs of the individual communities. Common analysis and documentation requirements have been identified and a single organizational element assigned responsibility for their accomplishment. The results are then made available to all participating organizations.

The results of the LSA Tasks are captured in the RMS Logistic ADP system. Access to the LAS information provides all users with the most current data necesary to conduct their area-specific program tasks. This approach is a practical implementation of the "create once, use many times" concept. In addition to the capture and dissemination of supportability data among the individual communities, the LAS database serves as a planning and tracking system for management of the RMS LSA program.

LSA is an iterative process that commences with the establishment of supportability requirements and constraints for hardware, software and support system designs by the Navy. These top level requirements are further allocated to lower level components and support elements by NCASC and the RMS Program organization. As RMS component design alternatives are developed, the LSA process is used to identify and quantify hardware design characteristics which impact on the support constraints, as well as, defining the support requirements of the RMS design. These defined support requirements provide the basis for design of the RMS support system within the Navy's three level maintenance support concept.

The LSA database captures and interrelates the RMS system supportability characteristics. This information is used to identify and quanitfy the support resource requirements associated with thte hardware design and the planned support concept. Through the use of the integrated LSAR database, deficiencies in the supportability characteristics are highlighted for consideration of alternative design approaches and/or alternative support concepts. Upon completion of the hardware and support system design processes, the LSAR database is used to develop the various logistics products ensuring consistency of the individual products with the hardware design and with each other.

The following subparagraphs describe the analysis and documentation procedures and responsibilities as implemented by NCSC. They address the requirements for both the horizontal and vertical integration. The discussion includes non-ILS functions of the supportability-related program elements in order to fully define the LSA Program.

4.2 LSA TASK SUMMARY.

The tailored LSA program for RMS consists of the MIL-STD-1388-1A tasks shown in Figure 4-2. The primary focus of the current RMS LSA activities is directed at the "Front-End-Analysis" portion of the LSA process. The goal is the achievement of demonstratable influence on the emerging RMS hardware design. The primary objective is to define and quantify, specific supportability goals, constraints for the RMS hardware system resulting in the optimum balance of system availability and cost characteristics.

In addition to the focus on influence of the RMS design will be proof of the RMS support concept of "three level maintenance". This support concept consists of: (1) At-Sea Organizational and At-Sea Intermediate repair to include replacement of electronic modules, circuit card assemblies (CCAs), light bulbs/indicators, and fuses; connector replacement and cable repair; and engine servicing to include refueling, and oil/air filter replacement; (2) Intermediate Maintenance; and (3) Depot. The LSA Program will assess the effects of alternative RMS equipment and support system designs on the support concept based on their impacts with regard to types and quantities of support resources,

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Task 102, LSA Plan

Task 103, Program and Design Reviews

Task 201, Use Study

Task 202, Supportability Constraints

Task 301, Functional Requirements Identification

Task 302, Support System Alternatives

Task 303, Evaluation of Alternatives and Tradeoff Analysis

Task 401, Task Analysis   .

Task 501, Supportability Test, Evaluation and Verification

Figure 4-1
LSA Task Requirements

costs, and the operational availability of the RMS system. The LSA program will identify and evaluate supportability risk associated with alternative concepts for both hardware and support system designs.

The LSA program is used to influence the RMS system requirements and designs for supportability and ensures development of the optimum support resource requirements. ILS identifies ten separate elements of support which can be generally divided into two categories. The two categories are Support Resource Drivers and Support Resources. During the current development activirties, the LSA Program concentration is on the Support Resource Driver category to maximize supportability influence on the RMS design. Trade-offs in the Support Resource Driver area will assess and evaluate their impacts in terms of types and quantities of support resources required. Trade-off criteria is being established to highlight predicted hardware characteristics, isolate potential deficiencies and identify opportunities for improvements in: Reliability (fewer support actions), Maintainability (less complexity) and operability (ease of use and support) as they relate to Life Cycle Costs. The Support Resource Driver elements of ILS include:

  a. Design Influence
  b. Maintenance Planning
  c. Manpower and Personnel
  d. Standardization/Interoperability
  e. Transportation/Transportability

The characteristics of the RMS system design with regard to these five elements are used to drive/establish system requirements.

As the design matures the LSA activities will shift their emphasis from influencing the design to design and optimization of the support system. These activities are primarily aimed at the identification and quantification of support resources for each of the Support Resource elements of ILS. This information is provided via the LSAR to the individual element managers so that appropriate steps can be taken to finalize the logistics products and procure the required resources needed for operational support. Figure 4-2 depicts the breakout of ILS elements by category.

SUPPORT RESOURCE DRIVERS	SUPPORT RESOURCES
Design Influence	Supply Support
Maintenance Planning	Support & Test Equipment
Manpower, Personnel**	Technical Publications
Standardization/Interoperability	Packaging, Handling, Storage & Transportation
	Facilities
	Computer Resources Support
	Training and Training Support

** Both Categories

Figure 4-2. Categories of ILS Elements

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4.2 LSA TASK PROCEDURES.

The RMS program is in early concept development. For this reason, the discussions of the LSA Program Tasks must address the considerations of all of the acquisition program phasdes, namely Concept Exploration & Definition, Demonstration & Validation, Engineering & Manufacturing Development and Production & Deployment. Consequently, within each of the Task Section writeups this plan deals with the principal program considerations relative to the individual program phase or state of the hardware design. It is encumbent upon the user of this guid to determine the appropriate phase relative to the hardware design and employ the guidance provided for a Task in that phase in order to properly define and implement the LSA Tasks. When the LsA for a particular hardware component is initiated after the start cf the design proces the user should review the guidance for the phases preceding the current design phase to determine what activities or decisions have or should have transpired so that the LSA program can be properly oriented.

4.2.1 Task Section 100, Program Planning and Control

4.2.1.1 Concept Exploration & Definition

Selected portions of LSA Task Section 100 which are appropriate for the conceptional design stage of a hardware development are defined in the following paragraphs. The Tasks described are those associated with the Performing Activity (NCSC) and do not include Tasks which should be accomplished by the Requiring Activity (PMS407).

<u>a. Task 102 - LSA Plan</u>

Definition.

The LSA Plan (DI-S-7017A) describes how the hardware developer of the system will execute the LSA program ·requirments contained in a xolicitation SOW. It provides the Requiring Authority with visibility of the performing organization's approach to LSA. In fact, if the plan is requested as a part of a contractor's proposal, it is often one of the considerationsd for source selection and normally becomes a part of the ensuing contract. For major programs, the LSA plan is generally submitted as a separate document; in smaller programs, it may be submitted as part of the contractor's Integrated Support Plan (ISP). Development of the LSA Plan includes performance of the following two subtasks:

    a.   Subtask 102.2.1 - Prepare LSA Plan (Concept Phase)
    b.   Subtask 102.2.2 - Update the LSA Plan (DEM/E&MD Phases)

<u>Subtask 102.1.2</u> - Prepare the LSA Plan. Performance of this subtask which will yield an LSA Plan, begins and is completed in the CE Phase. The plan includes the following information:

a. LSA program description.
b. LSA program management structure.
c. Identification of LSA tasks and how they will be performed.
d. LSA task accomplishment schedule.
e. Description of how LSA tasks and resulting data will interface with other ILS and system engineering elements of the program.
f. Identification of items upon which the LSA Tasks will be performed (LSA Candidate List)
g. Explanation of the LSA control numbering system.
h. Description of how supportability and supportability related design requirements will be disseminated/coordinated with the system designers and subcontractors.
i. Identificaion of data needed to perform LSA.
j. Description of procedures for updating and validating LSA data.
k. Identification of LSA requirements on GFE/GFM.
l. Description of LSA task management control procedures.
m. Description of procedures for identifying and correcting design problems or deficiencies affecting supportability.
n. Description of the LSA data collection, documentation and dissemination system.

Task Input.

The primary input to this subtask is Task 101 - Early LSA Stragety. The LSA Strategy is normally conducted by the Requiring Authority and details the LSA requirements and supporting rationale based upon program peculiar considerations. The LSA Strategy forms the basis for the SOW requirements and the supportability and supportability-related requirements of teh system specification. The contractor uses that information as the basis for preparing the Plan.

Task Output.

The output of this task is the contractor's road map of what LSA is to be accomplished and how and when it will be done.

b. Task 103 - Program and Design Reviews

Definition.

This task is intended to assure LSA program participation in the official review and control of system design information; the scheduling of detiled LSA program reviews; assessment of logistics risks at system program reviews; and integration of pertinent aspects of the LSA program into all formal program and design reviews. Such reviews provide an important mechanism for accomplishing design influence and tradeoffs. Task 103 is divided into the following four subtasks:

Space Station Freedom C&TS

    o Subtask 103.2.1 - Establish Design Review Procedures (Concept)

    o Subtask 103.2.2 - Participate in Formal System Design Reviews
             (DEM/VAL and FSD)

    o Subtask 103.2.3 - Participate in Formal Program Reviews (DEM/VAL,
             FSD, and Production Phases).

    o Subtask 103.2.4 - Participate in LSA/LSAR Reviews (DEM/VAL, FSD,
             and Production Phases).

Subtask Procedures

Subtask 103.2.1 - Establish Design Review Procedures. Performance of
Task 103 during the Concept Phase generates the conduct of Subtask
103.2.1. This subtask is designed to establish procedures within the
LSA program performing activity for internal review of system design
information to ensure that supportability requirements can be met. It
provides supportability specialists, in the performing organization,
the authority needed to influence design and tradeoffs.

Input.

The contractor's internal organizational structure and management
procedures are the primary input to this task.

Output.

Internal procedures, controls, and authorities for the conduct of
this type review will generally be documented in the LSA Plan.

4.2.1.2 Demonstration/Validation

The DEM/VAL phase consists of those actions required to verify
preliminary design and engineering, accomplish necessary planning,
analyze trade-off proposals, resolve or minimize logistics problems
identified during the conceptual phase, and validate a concept for
full-scale development. Advanced development prototypes should be
used and tested during the validation phase to estimate the system's
utility, cost, environmental impact, safety, human engineering,
operational effectiveness and suitability to include surety and/or
technological factors; and to refine configuration prior to entering
FSD.

a. Task 102 - LSA Plan

Performance of this task during DEM/VAL consists of accomplishing
Subtask 102.2.2 - Update the LSA Plan, as required.

Subtask Procedure.

Subtask 102.2.2 - Update the LSA Plan. Using analyses results,
program schedule modifications and/or program decisions made since

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the LSA Plan was completed in CE, the plan will be appropriately
updated to reflect specific efforts to be accomplished during the
DEM/VAL Phase.

Input.

Requiring Authority updates of Task 101 - Early LSA Strategy, results
of LSA Guidance conferences, and any modifications to the program
likely to affect supportability are used to update the LSA Plan
during this phase.

Output.

An up-to-date LSA Plan that reflects the planned LSA effort for the
DEM/VAL Phase. The plan should include sufficient detail to define
the current program and carry the LSA into FSD.

b. Task 103 - Program and Design Reviews

Performance of this task during the DEM/VAL consists of active
participation of supportability specialists in system design reviews
(Subtask 103.2.2), formal system program reviews (Subtask 103.2.3),
and detailed LSA/LSAR program reviews (Subtask 103.2.4). Procedures
for performance of each DEM/VAL Phase subtask are described below.

Subtask Procedures

Subtask 103.2.2 - Participate in Formal System Design Reviews.
Performance of this subtask ensures that supportability and
supportability design requirements are specifically considered during
each formal system design review, e.g., System Design Review (SDR),
Preliminary Design Review (PDR), Critical Design Review (CDR). The
primary purpose of performing this task is to assess the effect of
design features on system supportability, cost and readiness drivers,
and new/critical logistics support resource requirements.

Input.

Design review schedule and review of drawings and/or other design
data that will be subject to Requiring Authority review.

Output.

Agendas for and documented results of each system design review that
specifically addresses supportability issues.

Subtask 103.2.3 - Participate in Formal Program Reviews. Periodic
program reviews with the customer are an integral part of the LSA
Program review process. It is an opportunity to exchange information
and obtain specific guidance for the Requiring Authority, as well as,
to present the status of the LSA Program. This task ensures that LSA
program status forms a part of each program review, whether conducted
internally with subcontractors or with the requiring authority.

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Input.

Program review schedule and advance notification to participants of all scheduled program reviews.

Output.

Agendas for and documented results of each program review that specifically addresses supportability issues.

Subtask 103.2.4 - Participate in LSA/LSAR Reviews. LSA reviews identify and address all pertinent aspects of the LSA program to a more detailed level than that covered at design and program reviews. Representative discussion items include LSA task results/status, LSA data and its documentation in the LSAR, design and supportability problems, test schedule and progress, and the status of subcontractors' efforts. LSA reviews are conducted as part of ILS reviews when possible, and generally are specified/ scheduled in the SOW for Task 103. This subtask also includes conduct of an LSA guidance conference as soon as possible after contract award to assure a thorough and consistent understanding of the LSA requirements between the requiring authority and performing activity.

Input.

LSA review schedule and advance notification to participants of all scheduled LSA reviews. Data packages for review of LSAR documentation must be made available to reviewers for preliminary review in advance of such reviews. Where possible this information should be made available using remote access capabilities to permit on-line access at the convenience of the individual reviewing organizations.

Output.

Agendas for and documented results of each LSA review. Another important output of this subtask when it includes examination of LSAR is the approval status of individual LSAR data packages.

4.2.1.3   Full Scale Development

The goal of the FSD Phase is to produce a fully tested, documented, and production-engineered design of the concept selected during DEM/VAL. The design must be cost-effective, operationally suitable, producible, and logistically supportable. It is developed through an iterative process of design-test-redesign. The final product is a baseline configuration package. Concurrently, nonmaterial aspects required to deploy on integrated systems are developed, refined, and finalized. An essential activity of the FSD Phase is that of adequate test and evaluation by the Government and contractors.

a.   Task 102 - LSA Plan

Performance of this Task during FSD consists of accomplishing Subtask

102.2.2 - LSA Plan, as required.

Subtask Procedures.

Subtask 102.2.2 - Update the LSA Plan. Same as DEM/VAL.

Input.

Same as DEM/VAL.

Output.

Same as DEM/VAL.

b. Task 103 - Program and Design Reviews.

Performance of this task during FSD entails continued participation by supportability representatives in system design reviews (Subtask 103.2.2), formal program reviews (Subtask 103.2.3), and LSA/LSAR reviews (Subtask 103.2.4).

4.2.1.4 Production

The primary objective of this phase is to produce efficiently and deliver to the operating unit an effective, supportable system in a timely manner and at minimum Cost.

Selected LSA tasks in Series 100 - Program Planning and Control, Series 400 -Determination of Logistics Support Resource Requirements, and Series 500 -Supportability Assessment, defined and described below, are accomplished in this phase.

a. Task 102 - LSA Plan .   .

Performance of this Task during PRoduction consists of accomplishing Subtask 102.2.2 - LSA Plan, as required in order to insure active participation of the logistics community in the review and approval of all proposed engineering changes developed by manufacturing.

Subtask Procedures.

Subtask 102.2.2 - Update the LSA Plan. Same as FSD.

Input.

Same as FSD.

Output.

Same as FSD.

b. Task 103 - Program and Design Reviews

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o Subtask 301.2.2 - Unique Functional Requirements

o Subtask 301.2.3 - Risks

o Subtask 301.2.4 - Operations and Maintenance Tasks

o Subtask 301.2.5 - Design Alternatives

o Subtask 301.2.6 - Updates

Subtask Procedures.

Subtask 301.2.1 - Functional Requirements. The purpose of this subtask is to identify the functions which must be performed to operate and maintain the system, and to return it to an operational condition after a malfunction.

Input.

During this phase, input to this subtask is derived from Subtasks 203.2.1 - Identify Comparative Systems, 203.2.2 - Baseline Comparison System, Task 205 - Support Related Design Factors, and the Reliability, Maintainability, Safety and Human Factors Engineering Programs.

Output.

Performance of this subtask continues into DEM/VAL and is an input to Subtask 301.2.2 - Unique Functional Requirements and Task 302 - Support System Alternatives.

Subtask 301.2.2 - Unique Functional Requirements. The purpose of this subtask is to analyze the functions identified in Subtask 301.2.1 - Functional Requirements described above. The analysis reveals those unique support requirements for the new system stemming from new technology or deployment concepts, as well as the cost, readiness, or supportability drivers.

Input.

Input to this subtask is derived from Subtasks 203.2.1 - Identify Comparative Systems, 203.2.2 - Baseline Comparison Systems, Task 205 - Support Related Design Factors, ant Subtask 301.2.1 - Functional Requirements.

Output.

Performance of this subtask continues into DEM/VAL. It is an input to Task 302 - Support System Alternatives.

Subtask 301.2.3 - Risks. The purpose of this subtask is to analyze the risks associated with functions identified in Subtask 301.2.1 - Functional Requirements and 301.2.2 - Unique Functional Requirements.

Input.

Input to this subtask is derived from Subtasks 301.2.1 - Functional
Requirements and 301.2.2 - Unique Functional Requirements.

Output.

Performance of this subtask continues into DEM/VAL Phase and is an
input to Task 302 - Support System Alternatives.

Subtask 301.2.4 - Operations and Maintenance Tasks. The purpose of
this subtask is to identify the specific tasks which must be
performed in satisfying the functional support requirements
identified in Subtasks 301.2.1 Functional Requirements and 301.2.2 -
Unique Functional Requirements. Failure Modes and Effects Analysis
(FMEA) is performed by the Reliability community to identify the
corrective maintenance tasks. Additionally, Reliability Centered
Maintenance (RCM) analysis is performed to identify the Preventive
Maintenance tasks. Analysis of systems operations is conducted to
identify other non-maintenance support tasks which must be planned.

Input.

Input to this task is derived from Subtasks 301.2.1 - Functional
Requirements and 301.2.2 - Unique Functional Requirements.

Output.

Performance of this subtask continues into FSD. Performance of this
subtask provides data for entry into LSAR sheets B, B1, B2 , C, D,
and D1, and is an input to Tasks 302 - Support System Alternatives,
and 401 - Task Analysis.

Subtask 301.2.5 - Design Alternatives. The purpose of this subtask is
to use the functional requirements identified earlier in the first
two subtasks as a basis for design feedback to correct design
deficiencies.

Input.

Input to this subtask is the preceding subtasks of this task.

Output.

Performance of this subtask continues into FSD and is an input to
Task 302 - Support System Alternatives.

Subtask 301.2.6 - Updates. The purpose of this subtask is to provide
updates of the functional requirements as the design of the new
system progresses.

Input.

There is no input, as such, because this is an updating action.

Output.

Performance of this subtask continues into FSD. The results of this subtask can result in new or updates to existing LSAR B, C, D, and D1 sheets.

b. Task 302 - Support System Alternatives

Definition.

Support alternatives for a new system addresses each element of Integrated Logistics Support (ILS), and must satisfy all functional requirements of the new system. These alternatives consider supportability, cost, and readiness drivers, as well as, the unique functional requirements of the new system. Since support system concepts can vary widely in terms of cost, operational availability, and manpower requirements; it is the purpose of this task to determine the which support system alternative is best for the new system. To accomplish this purpose, this task consists of the following, five (5) subtasks:

o Subtask 303.2.1 - Alternative Support Concepts

o Subtask 302.2.2 - Support Concept Uptates

o Subtask 302.2.3 - Alternative Support Plans

o Subtask 302.2.4 - Support Plan Updates

o Subtask 302.2.5 - Risks

Subtask Procedures.

Subtask 302.2.1 - Alternative Support Concepts. The performance of this subtask identifies alternative support concepts which are viable with regard to the individual ILS elements and to the design and operational concepts proposed for the new system.

Input.

Input to this subtask is obtained from Tasks 203 - Comparative Analysis, 204 - Technological Opportunities, 205 - Supportability and Supportability Related Design Factors, and 301 - Functional Requirements Identification.

Output.

Performance of this subtask continues into and is completed during DEM/VAL. It is an input to Task 303 -Evaluation of Alternatives and Tradeoff Analysis.

Subtask 302.2.2 - Support Concept Updates. The purpose of this subtask is to update the support system concept as a result of changes in imposed constraints, operational scenarios, etc.,

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resulting from the maturation of the program.

Input.

Changes in the designs, contraints and support concepts as the new system program matures.

Output.

Performance of this subtask continues into, and is completed in DEM/VAL. It is an input to Task 303 - Evaluation of Alternatives and Tradeoff Analysis.

Subtask 302.2.3 & Subtask 302.2.4 -_ These subtasks are not started until FSD, however, some selective actions may be undertaken in preparation for performance of these two (2) subtasks.

Subtask 302.2.5 - Risks. The purpose of this subtask is to evaluate the risks associated with the alternative support concepts identified in Subtask 302.2.1.

Input.

There is no input, as such, for this subtask as it is an effort to evaluate the risks involved in the alternative support concepts.

Output.

Performance of the subtask is continued into FSD. It is an input to Task 303 - Evaluation of Alternatives and Tradeoff Analysis.

c. Task 303 - Evaluation of Alternatives and Tradeoff Analysis

Definition.

The purpose of this task is to provide quantitative measures of the readiness, supportability, and costs of various design and/or support system alternatives for the new system. It provides the basis for selecting the support concept and establishing a balance among support, performance and operational considerations.

This task includes the performance of the following ten (10) subtasks:

o Subtask 303.2.1 - Tradeoff Criteria

o Subtask 303.2.2 - Support System Tradeoffs

o Subtask 303.2.3 - System Tradeoffs

o Subtask 303.2.4 - Sensitivities

o Subtask 303.2.5 - Manpower and Personnel Tradeoffs

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o Subtask 303.2.6 - Training Tradeoffs

o Subtask 303.2.7 - Repair Level Analysis

o Subtask 303.2.8 - Diagnostic Tradeoffs

o Subtask 303.2.9 - Comparative Evaluations

o Subtask 303.2.10 - Energy Tradeoffs

Subtask Procedures.

Subtask 303.2.1 - Tradeoff Criteria. The purpose of this subtask is to establish the criteria for performing the balance of the subtasks in this task. These criteria, are developed in coordination with the Requiring Authority and the Design and Systems Engineering communities.

Input.

Input to this subtask is derived from Task 302 - Support System Alternatives and stantard procedures/models, e.g., EDCAS, Price (LCC).

Output.

Performance of this subtask continues into FSD and is an input into the balance of the subtasks in this task. It should yield the following types of information for use by the performing activity in its accomplishment of the other subtasks:

o Review and approval methods and procedures.

o Specific evaluations, tradeoffs, and analyses to be performed.

o Specific analytical relationships, techniques, or models to be used.

o Limiting constraints in quantities or skills of operator or support personnel.

o Manpower and personnel cost factors to be used in accomplishing evaluations, analyses, and tradeoffs.

Subtask 303.2.2 - Support System Tradeoffs. The purpose of this subtask is to determine the best support system relative to those identified through Task 302 - Support System Alternatives. Evaluations and tradeoffs are contucted for and between all support systems being considered for the C&TS system.

Input.

Input to this subtask is obtained from Task 302 - Support System

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Alternatives and Subtask 303.2.1 - Tradeoff Criteria.

Output.

Performance of this subtask is continued into FSD. It is an input to Tasks 205 - Supportability and Supportability Related Design Factors, 401 - Task Analysis, and 40 2 - Early Fielding Analysis.

Subtask 303.2.3 - System Tradeoffs. The purpose of this subtask is to recommend system alternative(s) based on cost, schedule, operational availability, performance, and supportability factors. This is performed by the Systems Engineering personnel with input from logistics specialist.

Input.

Input to this task is derived from Task 205 - Supportability and Supportability Related Design Factors and Task 302 - Support System Alternatives.

Output.

Performance of this subtask continues into FSD. It is an input to Tasks 205 - Supportability and Supportability Related Design Factors, 401 - Task Analysis, and 402 - Early Fielding Analysis.

Subtask 303.2.4 - Sensitivities. The purpose of this subtask is to analyze the impact variations in design and support parameters have on system availability. Key considerations are spares budgets, R&M factors, support and test equipment, and manpower and personnel skills availability.

Input.

Input to this task is Tasks 205 - Supportability and Supportability Related Design Factors and 302 - Support·System Alternatives.

Output.

Performance of this subtask continues into FSD. It is an input to Tasks 401 - Task Analysis and 402 - Early Fielding Analysis.

Subtask 303.2.5 - Manpower and Personnel Tradeoffs. The purpose of this subtask is to analyze the alternative support system concepts in terms of the number of personnel, skill levels, specialty codes, etc., associated with each.

Input.

Input to this subtask are the outputs from Tasks 205 -Supportability ant Supportability Related Design Factors, 302 -Support System Alternatives, and any known manpower and personnel constraints.

Output.

The performance of this subtask continues into FSD Phase. It is an input to Tasks 401 - Task Analysis and 402 - Early Fielding Analysis.

Subtask 303.2.6 - Training Tradeoffs. The purpose of this task is to evaluate operational concepts, and personnel skill level requirements of each alternative to establish the optimum training program to support the new system's operations and maintenance requirements.

Input.

Input to this subtask is derived from Tasks 205 - Supportability and Supportability Related Design Factors and 302 -Support System Alternatives.

Output.

Performance of this subtask continues into FSD. It is an input to Tasks 401 - Task Analysis and 402 - Early Fielding Analysis.

Subtask 303.2.7 - Repair Level Analysis. During DEM/VAL the level of repair analysis activities are primarily used as a design tools to establish the optimum design requirements relative to logistic support. The C&TS LSA Program employs the EDCAS model for this purpose.

The EDCAS Model is an interactive computer program for estimating Life Cycle Cost of electronic equipment under two user definable environments called E1 and E2. EDCAS consists of three linked modules: an equipment cost model, a line removable unit (LRU) cost model and a shop removable unit (SRU) cost model. EDCAS can be used for several types of design/cost tradeoff analyses including hardware/manpower tradeoffs and preliminary level of repair analysis.

Neither EDCAS nor any other cost model attempts to find "optimal" values for design-descriptive input values. Instead, the model computes the least life cycle achievable, given a specific design. The major part of the software surrounding the model is dedicated to helping the engineer find, quickly and easily, the feasible combination of inputs that will produce the lowest life cycle.

Subtask 303.2.8 - Diagnostic Tradeoffs. The purpose of this subtask is to analyze alternative diagnostic concepts such as Built-in Test (BIT), manual testing, automatic testing, etc., to determine the best diagnostic approach for each alternative under consideration.

Input.

Input to this subtask is dervied from Tasks 205 - Supportability and Supportability Related Design Factors and 302 - Support System Alternatives.

Output.

Performance of this subtask is continued into and completed during

DEM/VAL. It is an input to Tasks 401 - Task Analysis and 402 Early Fielding Analysis.

Subtask 303.2.9 - Comparative Evaluations. The purpose of this subtask is to use the data gained as a result of other Task 303 efforts to update the comparative analysis performed in Task 203 - Comparative Analysis.

Input.

Input to this subtask is derived from other parts of this task and Tasks 203 - Comparative Analysis and 302 - Support System Alternatives.

Output.

Performance of this subtask is continued into and completed during DEM/VAL. It is an input back into Tasks 203 - Comparative Analysis and Tasks, 401 - Task Analysis, and 402 -Early Fielding Analysis.

Subtask 303.2.10 - Energy Tradeoffs. The purpose of this subtask is to conduct tradeoffs between the system alternatives proposed and the corresponding Petroleum, Oil, and Lubricants (POL) requirements.

Input.

Input to this subtask is derived from Tasks 203 - Comparative Analysis and 302 - Support System Alternatives.

Output.

Performance of this subtask is continued into and completed during DEM/VAL. It is an input back into Task 203 - Comparative Analysis and also Tasks 401 - Task Analysis and 402 -Early Fielding Analysis.

4.2.3.2 Demonstration and Validation

a. Task 301 - Functional Requirements Identification

Performance of this task during DEM/VAL consists of updating and refining Subtasks 301.2.1 - Functional Requirements, 301.2.2 - Unique Functional Requirements, 301.2.3 - Risks, 301.2.4 Operations and Maintenance Tasks, 301.2. - Design Alternatives and 301.2.6 Updates.

Subtask Procedures

Subtask 301.2.1 - Functional Requirements. The functions which must be performed to operate and maintain the system, and to return it to an operational condition after a malfunction which were identified during the CE are reviewed and updated in light of the maturing design, operational scenario, etc.

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Input.

During this phase, input to this subtask is derived from updated Subtasks 203.2.1 - Identify Comparative Systems, 203.2.2 - Baseline Comparison System, and Task 205 - Support Related Design Factors and other Design and Systems Engineering information (i.e. FMEA/FMECA).

Output.

Performance of this subtask is completed during this phase. Some updating may be required during FSD to accommodate late design changes.

The updated and refined data is an input to Subtask 301.2.2 - Unique Functional Requirements and Task 302 - Support System Alternatives.

Subtask 301.2.2 - Unique Functional Requirements. The analysis of those unique requirements for the new system stemming from the use of new technology or deployment concepts, as well as, the cost, operational availability, or other supportability drivers which was performed in the CE is updated and refined.

Input.

Input to this subtask is derived from updated Subtasks 203.2.1 Identify Comparative Systems, 203.2.2 - Baseline Compariso n Systems, Task 205 - Support Related Design Factors, and Subtask 301.2.1 - Functional Requirements.

Output.

Performance of this subtask is completed during this phase. The updated data is an input to Subtask 301.2.3 - Risks Task 302 -Support System Alternatives.

Subtask 301.2.3 - Risks. The purpose of this subtask during this phase is to re-analyze the risks associated with the functions identified in updated Subtasks 301.2.1 - Functional Requirements and .301.2.2 - Unique Functional Requirements.

Input.

Input to this subtask is derived frc , updated Subtasks 301.2.1 Functional Requirements and 301.2.2 - Unique Functional Requirements.

Output.

Performance of this subtask is completed during this phase. The updated data is an input to Task 302 - Support System Alternatives.

Subtask 301.2.4 - Operations and Maintenance Tasks. The purpose of this subtask during this phase is to further define the specific tasks which must be performed in carrying out the functional requirements identified in updated Subtasks 301.2.1 - Functional

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Requirements and 301.2.2 - Unique Functional Requirements. Failure Modes and Effects Analysis (FMEA) is updated to conform to the maturing design to identify the Corrective Maintenance tasks. Additionally, Reliability Centered Maintenance (RCM) analysis is updated to identify the Preventative Maintenance tasks. The C&TS LSA Program is using the McDonnell Douglas RCM Logic for performance of the RCM analysis.

Input.

Input to this task is derived from updated Subtasks 301.2.1 Functional Requirements and 301.2.2 - Unique Functional Requirements.

Output.

Performance of this subtask continues into FSD. It provides data for entry into LSAR sheets B, B1, B2, C, D, and D1, and is an input to Tasks 302 - Support System Alternatives, and 401 - Task Analysis.

Subtask 301.2.5 - Design Alternatives. The purpose of this subtask during this phase is to use the updated functional requirements identified earlier in the first two subtasks as a basis for design feedback to correct design deficiencies.

Input.

Input to this subtask is derived from the preceding updated subtasks of this task.

Output.

Performance of this subtask continues into FSD and the refined data is an input to Task 302 - Support System Alternatives.

Subtask 301.2.6 - Updates. The purpose of this subtask is to continue updates of the functional support requirements as the design of the new system progresses and to begin to lay out the basic support system design.

Input.

There is no input, as such, because this is an updating action.

Output.

Performance of this subtask continues into FSD. The results of this subtask can result in new LSAR B, B1, B2, C, D, and D1 sheets. The data from this effort is an input to Task 302 - Support System Alternatives.

b. Task 302 - Support System Alternatives

Performance of this task during DEM/VAL consists of updating and refining Subtasks 302.2.1 - Alternative Support Concepts, 302.2.2 -

Support Concept Updates, and 302.2.5 - Risks. Subtasks 302.2.3 - Alternative Support Plans and 302.2.4 - Support Plan Updates are not performed until the Full Scale Development (FSD) Phase, however, some preliminary work on these two (2) subtasks can be initiated as data develops. A typical phasing of subtasks during DEM/VAL is depicted in Figure 3. Procedures for the performance of each DEM/VAL Phase subtask are described below.

Subtask Procedures.

Subtask 302.2.1 - Alternative Support Concepts. The performance of this subtask updates the alternative support concepts for each ILS element identified in the CE effort.

Input.

Input to this subtask is derived from updated Tasks 203 Comparative Analysis, 204 - Technological Opportunities, 205 -Supportability and Supportability Related Design Factors, and 301 - Functional Requirements Identification.

Output.

Performance of this subtask is completed during this phase. It serves as an updated input to Task 303 - Evaluation of Alternatives and Tradeoff Analysis.

Subtask 302.2.2 - Support Concept Updates. The purpose of this subtask is to update the support system concept as a result of changes in imposed constraints, operational scenarios, etc., resulting from the maturation of the program.

Input.

Changes in the support concept as the new system program matures.

Output.

Performance of this subtask is completed during this phase. It is an input to Task 303 - Evaluation of Alternatives and Tradeoff Analysis.

Subtask 302.2.3 and 302.2.4 - Alternative Support Plans and Support Plan Updates. These subtasks are not started until the FSD Phase; however, some selective actions may be undertaken in preparation for the performance of these two (2) subtasks.

Subtask 302.2.5 - Risks. The purpose of this subtask is to update the evaluation of the risks associated with the alternative support concepts identified in Subtask 302.2.1 during the CE.

Input.

Input to this subtask is data from updated Subtask 302.2.1 - Alternative Support Concepts.

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Output.

Performance of the subtask is continued into the FSD Phase. It is an updated input to Task 303 - Evaluation of Alternatives and Tradeoff Analysis.

c. Task 303 - Evaluation of Alternatives and Tradeoff Analysis

Performance of this task during DEM/VAL consists of initiating Subtask 303.2.7 - Repair Level Analysis, and updating the rest of the subtasks, all of which were started during the CE.

Subtask Procedures.

Subtask 303.2.1 - Tradeoff Criteria. The purpose of this subtask to to review and update the criteria to be used in performing the balance of the subtasks of Task 303 which were previously established during CE.

Input.

Input to this subtask is derived from Task 302 - Support System Alternatives.

Output.

Performance of this subtask continues into FSD and is an updated input into the balance of the subtasks in this task.

Subtask 303.2.2 - Support System Tradeoffs. The purpose of this subtask during this phase is to confirm or update the best support system alternative identified from those established by Task 302 - Support System Alternatives. Evaluations and tradeoffs are conducted for and between all support systems being considered for the new system.

Input.

Input to this subtask is derived from updated Task 302 - Support System Alternatives and Subtask 303.2.1 - Tradeoff Criteria.

Output.

Performance of this subtask is continued into the FSD Phase. It is an updated input to Tasks 305 - Supportability Relate d Design Factors, 401 - Task Analysis, and 402 - Early Fielding Analysis.

Subtask 303.2.3 - System Tradeoffs. The purpose of this subtask during this phase is to update the recommended system alternative(s) based on cost, schedule, operational availability, performance, and other supportability factors which were identified during the CE. This is normally performed by the Systems Engineering personnel with input from logistics representatives.

Input.

Input to this task is derived from updated Tasks 205 - Supportability and Supportability Related Design Factors and 302 - Support System Alternatives.

Output.

Performance of this subtask continues into the FSD Phase. It is an updated input to Tasks 205 - Supportability and Supportability Related Design Factors and the initial input to 401 - Task Analysis.

Subtask 303.2.4 - Sensitivities. The purpose of this subtask during this phase is to update the impact variations in design and support parameters have on system readiness which were originally analyzed during the CE. Key considerations are spares budgets, R&M factors, and manpower and personnel skills availability.

Input.

Input to this task is derived from updated Tasks 205 - Supportability and Supportability Related Design Factors and 302 - Support System Alternatives.

Output.

Performance of this subtask continues into FSD. It is input to Task 401 - Task Analysis.

Subtask 303.2.5 - Manpower and Personnel Tradeoffs. The purpose of this subtask during this phase is to update the system concept alternatives in terms of the number of personnel, skill levels, specialty codes, etc., required which were originally analyzed during the CE.

Input.

Input to this subtask is derived from updated Tasks 205 - Supportability and Supportability Related Design Factors, 302 - Support System Alternatives, and any known manpower and personnel constraints.

Output.

The performance of this subtask continues into the FSD Phase. It is an input to Tasks 401 - Task Analysis.

Subtask 303.2.6 - Training Tradeoffs. The purpose of this subtask during this phase is to update analyses and tradeoffs among design, operational concepts, and personnel skill level requirements which were conducted during the CE to achieve a viable training program to support the new system's operations and maintenance requirements.

Input.

Input to this subtask is derived from updated Tasks 205 - Supportability and Supportability Related Design Factors and 302 - Support System Alternatives.

Output.

Performance of this subtask continues into the FSD Phase. It is an input to Tasks 401 - Task Analysis.

Subtask 303.2.7 - Repair Level Analysis. This subtask is initiated during this phase and its purpose is to perform the traditional level of repair analysis commensurate with the level of design, operation, and support data available at this time.

Input.

Input to this subtask is derived from Task 302 - Support System Alternatives.

Output.

Performance of this subtask continues into the FSD Phase. It is an input to Task 401 - Task Analysis.

Subtask 303.2.8 - Diagnostic Tradeoffs. The purpose of this subtask during this phase is to update and complete the alternative diagnostic concepts such as Built-in Test (BIT), manual testing, automatic testing, etc., which were initially analyzed during the CE to determine the best diagnostic approach for each alternative under consideration.

Input.

Input to this subtask is derived from updated Tasks 205 - Supportability and Supportability Related Design Factors and 302 - Support System Alternatives.

Output.

Performance of this subtask is completed during this phase. It is an input to Tasks 401 - Task Analysis.

Subtask 303.2.9 - Comparative Evaluations. The purpose of this subtask during this phase is to update and complete the comparative evaluations using the data gained as a result of other Task 303 efforts to update the comparative analysis performed in Task 203 - Comparative Analysis.

Input.

Input to this subtask is derived from other updated parts of this task and Tasks 203 - Comparative Analysis and 302 - Support System Alternatives.

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Output.

Performance of this subtask is completed during this phase. It is an input back into Task 203 - Comparative Analysis, and Tasks 401 Task Analysis.

Subtask 303.2.10 - Energy Tradeoffs. The purpose of this subtask during this phase is to update and complete tradeoffs between the proposed system alternatives and the corresponding Petroleum, Oil, and Lubricants (POL) requirements conducted during the CE. Some selective updating could be required for this subtask during the FSD Phase to accommodate late design or operational changes.

Input.

Input to this subtask is derived from updated Tasks 203 Comparative Analysis and 302 - Support System Alternatives.

Output.

Performance of this subtask is essentially completed during this phase. It is an input back into Task 203 - Comparative Analysis and also Tasks 401 - Task Analysis.

4.2.3.3 Full Scale Development

a. Task 301 - Functional Requirements Identification

Performance of this task during FSD Phase consists of updating, refining, and completing Subtasks 301.2.4 - Operations and Maintenance Tasks, 301.2.5 - Design Alternatives, and 301.2.6 - Updates. The first three subtasks were completed during DEM/VAL. They may, however, require some minor update during FSD. Subtask Procedures.

Subtask 301.2.4 - Operations and Maintenance Tasks. The purpose of this subtask during this phase is to further define the specific tasks which must be performed in carrying out the functional requirements identified in the latest updated Subtasks 301.2.1 - Functional Requirements and 301.2.2 Unique Functional Requirements. Failure Modes and Effects and Criticality Analysis (FMEACA) information is further updated to conform to the maturing design to identify the Corrective Maintenance tasks. Additionally, Reliability Centered Maintenance (RCM) analysis is further updated to identify the Preventive Maintenance tasks.

Input.

Input to this task is derived from the latest updated Subtasks 301.2.1 - Functional Requirements and 301.2.2 - Unique Functional Requirements.

Output.

Performance of this subtask is completed during this phase. It provides updated data for entry into LSAR Records B, B1, B2, C, D, and D1, and is an input to Tasks 302 - Support System Alternatives, and 401 - Task Analysis.

Subtask 301.2.5 - Design Alternatives. The purpose of this subtask update the functional requirements identified earlier in the first two subtasks as a basis for design feedback to correct design deficiencies.

Input.

Input to this subtask is derived from the preceding updated subtasks of this task.

Output.

Performance of this subtask is completed during this phase and the refined data is an input to Task 302 - Support System Alternatives.

Subtask 301.2.6 - Updates. The purpose of this subtask is to continue updates of the functional requirements as the design of the new system become fixed during this phase.

Input.

There is no input, as such, because this is an updating action.

Output.

Performance of this subtask is completed during this phase. The results of this subtask can result in new LSAR B, C, D, and D1 Records. The updated data from this effort is an input to Task 302 - Support System Alternatives.

b. Task 302 - Support System Alternatives

Performance of this subtask during FSD consists of updating, refining, and completing Subtasks 302.2.5 - Risks, which was started during the Concept Phase and updated during DEM/VAL. Additionally, Subtasks 302.2.3 - Alternative Support Plans and 302.2.4 - Support Plan Updates are initiated and completed during this phase. Subtasks 302.2.1 - Alternative Support Concepts and 302.2.2 Support Concept Updates were completed during the previous DEM/VAL efforts.

Subtask Procedures.

Subtask 302.2.3 - Alternative Support Plans. The purpose of this subtask is to develop and document alternative support plans for the new system.

Input.

Input to this subtask is derived from Tasks 205 - Supportability

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Related Design Factors, 301 - Functional Requirements Identification and the results of 401, Task Analysis.

Output.

Performance of this subtask is completed during this phase. It is an input to Tasks 303 - Evaluation of Alternatives and Tradeoffs Analysis and 401 - Task Analysis.

Subtask 302.2.4 - Support Plan Updates. The purpose of this subtask is to update and refine the alternative support plans as tradeoffs are conducted and the new system's design and operational scenario become better defined.

Input.

Input to this subtask is derived from Tasks 205 - Supportability and Supportability Related Design Factors and 301 - Functional Requirements Identification.

Output.

Performance of this subtask is completed during this phase. It is an input to Tasks 303 - Evaluation of Alternative and Tradeoff Analysis and 401 - Task Analysis.

Subtask 302.2.5 - Risks. The purpose of this subtask during this phase is to further update and complete the evaluation of risks associated with the alternative support concepts identified in Subtask 302.2.1 - Alternative Support Concepts during the Concept Phase and updated during DEM/VAL.
Output.

Performance of this subtask is completed during this phase. It is an input to Tasks 303 - Evaluation of Alternatives and Tradeoff Analysis and 401 - Task Analysis.

c.   Task 303 - Evaluation of Alternatives and Tradeoff Analysis.

Performance of this task during FSD consists of updating and/or completing all of the subtasks except Subtasks 303.2.8 - Diagnostic Tradeoffs, 303.2.9 -Comparative Evaluations and 303.2.10 - Energy Tradeoffs which were completed during DEM/VAL.

Subtask Procedures.

Subtask 303.2.1 - Tradeoff Criteria. The purpose of this subtask during this phase is to update, refine, and complete the criteria for performing the balance of the subtasks in this task which were established during the CE and updated during DEM/VAL.

Input.

Input to this task is derived from Task 302 - Support System

Alternatives.

Output.

Performance of this subtask is completed during this phase and is an updated input into the balance of the subtasks in this task.

Subtask 303.2.2 - Support System Tradeoffs. The purpose of this subtask during this phase is to update, refine, and complete the best support system determined during the CE and updated during DEM/VAL for each new system alternative support system identified in Task 302 Support System Alternatives. Evaluations and tradeoffs are conducted for and between all support systems being considered for the new weapon system.

Input.

Input to this subtask is derived from the latest updated Task 302 - Support System Alternatives and Subtask 303.2.1 - Tradeoff Criteria.

Output.

Performance of this subtask is completed during this phase. It is an updated input to Tasks 305 - Supportability and Supportability Related Design Factors, 401 - Task Analysis, and 402 - Early Fielding Analysis.

Subtask 303.2.3 - System Tradeoffs. The purpose of this subtask during this phase is to update, refine, and complete the recommended system alternative(s) based on cost, schedule, operational availability, performance, and supportability factors which were identified during the CE and updated during DEM/VAL. This subtask is normally performed by the Systems Engineering personnel with input from logistics representatives.

Input.

Input to this task is derived from updated Tasks 205 - Supportability and Supportability Related Design Factors and 302 - Support System Alternatives.

Output.

Performance of this subtask is completed during this phase. It is an updated input to Tasks 205 - Supportability and Supportability Related Design Factors, 401 - Task Analysis, and 402 - Early Fielding Analysis.

Subtask 303.2.4 - Sensitivities. The purpose of this subtask during this phase is to update, refine, and complete the impact variations in design and support parameters have on system operational availibility which were originally analyzed during the CE and updated during DEM/VAL. Key considerations are spares budgets, R&M factors, and manpower and personnel skills availability.

Input.

Input to this task is derived from updated Tasks 205 - Supportability and Supportability Related Design Factors and 302 - Support System Alternatives.

Output.

Performance of this subtask is completed during this phase. It is an updated input to Tasks 401 - Task Analysis and 402 - Early Fielding Analysis.

Subtask 303.2.5 - Manpower and Personnel Tradeoffs. The purpose of this subtask during this phase is to update, refine, and complete the system concept alternatives in terms of the number of personnel, skill levels, specialty codes, etc., required which were originally analyzed during CE and updated during DEM/VAL.

Input.

Input to this subtask is derived from updated Tasks 205 - Supportability and Supportability Related Design Factors, 302 - Support System Alternatives, and any known manpower and personnel constraints.

Output.

The performance of this subtask is completed during this phase. It is an updated input to Tasks 401 - Task Analysis and 402 - Early Fielding Analysis.

Subtask 303.2.6 - Training Tradeoffs. The purpose of this subtask during this phase is to complete the analyses and tradeoffs among design, operational concepts, and personnel skill level requirements which were conducted during the Concept Phase and updated during DEM/VAL to achieve a viable training program to support the new system's operations and maintenance requirements.

Input.

Input to this subtask is derived from updated Tasks 205 - Supportability and Supportability Related Design Factors and 302 - Support System Alternatives.

Output.

Performance of this subtask is completed during this phase. It is an updated input to Tasks 401 - Task Analysis and 402 - Early Fielding Analysis.

Subtask 303.2.7 - Repair Level Analysis. The purpose of this subtask during this phase is to reiterate the level of repair analysis activities conducted during previous the phases. During this phase the purpose is to establish quantitative levels for spare and repair parts and for tools, test equipments and other support items.

Further the RLA is used to confirm projected system operational availability and life cycle cost estimates in order to establish necessary budgets.

Input.

Input to this subtask is derived from updated Task 302 - Support System Alternatives.

Output.

Performance of this subtask is completed during this phase. It is an updated input to Task 401 - Task Analysis and 402 - Early Fielding Analysis.

Subtask 303.2.8 - Diagnostic Tradeoffs. This subtask was completed during DEM/VAL. It is reiterated only in the event of design changes which may impact previous diagnostic capability projections.

Subtask 303.2.9 - Comparative Evaluations. This subtask was completed during DEM/VAL.

Subtask 303.2.10 - Energy Tradeoffs. This subtask was completed during DEM/VAL; however, some selective updating may be required during this phase to accommodate late design or operational changes in the program.

4.2.3.4 Production and Deployment

4.2.4 Task Section 400, Determination of Logistic Support Resource
        Requirements
4.2.4.1 Concept Exploration

Task Section 400 is not employed during the CE phase due the high degree of instability of the design. Detailed support information to be used to assist in the development of conceptual designs are obtained through the use of historical information from similar systems through the Comparative Analysis (Task 203).

4.2.4.2 Demonstration and Validation

a. Task 401, Task Analysis

Performance of this task during DEM/VAL consists of performing Subtasks 401.2.1 - Task Analysis, 401.2.2 - Analysis Documentation, 401.2.3 -New/Critical Support Resources, 401.2.4 - Training Requirements and Recommendations, 401.2.5 - Design Improvements, 401.2.6 Management Plans, 401.2.8 - Provisioning Requirements, 401.2.9 - Validation, and 401.2.11 -LSAR Updates. Subtask 401.2.7 -Transportability Analysis was performed during CE and updated during DEM/VAL.

Performance of this task requires the utmost in coordination and interfacing because it involves essentially every system engineering discipline and ILS functional element manager. During DEM/VAL the key is not to implement the Task Analysis for those portions of the design that are highly unstable. The communities involved in the Task Analysis must include Design, reliability, maintainability, safety, etc.

Subtask Procedures.

<u>Subtask 401.2.1</u> - Task Analysis. The purpose of this subtask is to analyze each operations and maintenance task previously identified by Task 301 - Functional Requirements Identification. The analyses should be completed to the lowest reparable assembly level as soon as the initial design is established.

Input.

During this phase, input to this subtask is derived from Subtasks 301.2.4 - Operations and Maintenance Tasks and 303.2.2 - Support System Trade-offs.

Output.

Performance of this subtask is completed during this phase. Some updating may be required during Production to accommodate engineering change activity. Data from this subtask is documented in the LSAR on the C, D, D, and D1 Records. New or peculiar support resource requirements are captured on the LSAR E, F, and G Records. The LSAR serves as the primary input to Task 501 -Supportability Test, Evaluation, and Verification.

<u>Subtask 401.2.2</u> - Analysis Documentation. This subtask, along with Subtask 401.2.1 - Task Analysis discussed above, are the basic subtasks of Task 401. Both are performed to the lowest reparable assembly level as soon as the initial designs are established. The purpose of this subtask is to document the results of subtask 401.2.1 - Task Analysis.

Input.

During this phase, input to this subtask is derived from Subtask 401.2.1 - Task Analysis.

Output.

Performance of this subtask is initiated during this phase for those portions of the design which are stable and will be updated during the FSD Phase. Data from this subtask, along with data from Subtask 401.2.1 - Task Analysis is documented in the LSAR C, D, and D1 Records. New or peculiar support resources are flagged using the LSAR E, F and G Records. The results will be used to support the demonstations conducted under Task 501 -Supportability Test, Evaluation, and Verification.

Subtask 401.2.3 - New/Critical Support Resources. The purpose of this subtask is to identify resources which will require either new development or special attention to manage scarce resources.

Input.

During this phase, input to this subtask is derived from Subtask 303.2.2 - Support System Tradeoffs.

Output.

Performance of this subtask is initiated during this phase and updated FSD. Further updating will be required during the Production Phase to accommodate later design changes. The support resources are documented in the LSAR E, E1, E2, F, and G Records. The Task results provide input to Subtask 401.2.6 - Management Plans; and Tasks 402 -Early Fielding Analysis and 501 - Supportability Test, Evaluation, and Verification.

Subtask 401.2.4 - Training Requirements and Recommendations. The purpose of this subtask is to identify training requirements and a method for providing the training. It must consider the task procedures, and manning and skill levels required to support the new system and equipment.

Input.

During this phase, input to this task is derived from Subtasks 401.2.1 - Task Analysis and 401.2.2 - Analysis Documentation.
Output.

The results of this subtask are documented in the LSAR D1 and G Records. It feeds Subtasks 402 - Early Fielding Analysis and 501 - Supportability Test, Evaluation, and Verification.

Subtask 401.2.5 - Design Improvements. The purpose of this subtask is to determine which operations and/or maintenance tasks fail to meet established goals. It should be performed by both the Performing Activity and the Requiring Authority because it verifies the supportability and supportability-related design goals previously established by Task 205 - Supportability Related Design Factors.

Input.

During this phase, input to this subtask is derived from Task 205 - Supportability Related Design Factors.

Output.

Subtask results are documented on the LSAR D1 and G Records. It feeds Task 303 -Evaluation of Alternatives and Tradeoff Analysis.

Subtask 401.2.6 - Management Plans. The purpose of this subtask is to identify any action which might be taken to lessen the risks

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associated with new or critical logistics resources.

Input.

During this phase, input to this subtask is derived from Subtask
401.2.3 - New/Critical Support Resources.

Output.

This subtask provides input to Task 303 -Evaluation of Alternatives
and Tradeoff Analysis.

Subtask 401.2.7 - Transportability Analysis. This subtask was
initiated during CE and is continually updated based upon the
evolving system design.

Subtask 401.2.8 - Provisioning Requirements. The purpose of this
subtask is to capture the initial provisioning information relative
to the hardware design.

Input.

During this phase, input to this subtask is derived from the
engineering drawings, R&M characteristics, and the individual
Logistics Element specialists from areas such as packaging,
cataloging and technical publications.

Output.

This subtask is used to build the LSAR H and H1 Records to support
initial spares projections and provisioning budget estimates.

Subtask 401.2.9 - Validation. The purpose of this subtask is to
validate the LSAR documentation. Validation is accomplished through
a combination of on-going internal review by the Performing activity,
periodic review by the Requiring Authority and through feedback of
the testing and demonstration efforts. Where possible, the LSAR
information should be made available to the Requiring Authority
reviewing activities via a remote access capability to minimize time
spent on-site and to ensure that they always have access to the most
current information to support their in-house activities.

Input.

During this phase, there is no input as such because the purpose of
this subtask is to confirm the validity of the LSAR data base.

Output.

Updates to the LSAR Data Records will be generated based upon
testing, demonstrations and internal and formal reviews.

Subtask 401.2.11 - LSAR Updates. The development of the LSAR is an
ongoing effort, becoming more complete and detailed as the new system

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and support system designs evolve and mature. It is, however, necessary to use the LSAR data as it evolves. This, in turn, requires updating the data as the LSA process continues to ensure the latest information is available to all ILS element managers and decision makers.

Input.

During this phase, input to this subtask is derived from the iterative nature of the LSA process. For example, as new LSA data is developed due to evolving design of the new system, the LSAR must be updated to reflect the latest status of the particular ILS element analysis.

Output.

LSAR updates based upon identified change requirements.

4.2.4.3 Full Scale Development

a. Task 401, Task Analysis

Performance of this task during FSD consists of performing Subtasks 401.2.1 - Task Analysis, 401.2.2 - Analysis Documentation, 401.2.3 - New/Critical Support Resources, 401.2.4 - Training Requirements and Recommendations, 401.2.5 - Design Improvements, 401.2.6 Management Plans, 401.2.8 -Provisioning Requirements, 401.2.9 - Validation, 401.2.10 - ILS Output Products, and 401.2.11 - LSAR Updates. Subtask 401.2.7 -Transportability Analysis was performed during CE. Performance of this task requires the utmost in coordination and interfacing because it involves essentially every system engineering discipline and ILS functional element manager. Design, reliability, maintainability, safety, etc. are all involved in satisfying the requirements of this task.

Subtask Procedures.

Subtask 401.2.1 - Task Analysis. The purpose of this subtask is to analyze each operations and maintenance task previously identified by Task 301 - Functional Requirements Identification. The analyses should be completed to the lowest reparable assembly level as soon as the initial design is established.

Input.

During this phase, input to this subtask is derived from Subtasks 301.2.4 - Operations and Maintenance Tasks and 303.2.2 - Support System Trade-offs.

Output.

Some updating may be required during Production to accommodate engineering change activity. Data from this subtask is documented in the LSAR on the C, D, D, and D1 Records. New or peculiar support

resource requirements are captured on the LSAR E, F, and G Records. The completed LSAR defines the support system as designed and serves as the primary input to Task 402 -Early Fielding Analysis and Task 501 -Supportability Test, Evaluation, and Verification.

Subtask 401.2.2 - Analysis Documentation. This subtask, along with Subtask 401.2.1 - Task Analysis discussed above, are the basic subtasks of Task 401. Both are performed to the lowest reparable assembly level as soon as the initial design is established. The purpose of this subtask is to document the results of subtask 401.2.1 - Task Analysis.

Input.

During this phase, input to this subtask is derived from Subtask 401.2.1 - Task Analysis.

Output.

Updates will be required during Production to capture changes resulting from design change activity. Data from this subtask, along with data from Subtask 401.2.1 - Task Analysis is documented in the LSAR C, D, and D1 Records. New or peculiar support resources are flagged using the LSAR E, F and G Records. and is an input to Tasks 402 - Early Fielding Analysis and 501 - Supportability Test, Evaluation, and Verification.

Subtask 401.2.3 - New/Critical Support Resources. The purpose of this subtask is to identify resources which will require either new development or special attention to manage scarce resources.

Input.

During this phase, input to this subtask is derived from Subtask 303.2.2 - Support System Tradeoffs.

Output.

Some updating may be required during the Production Phase to accommodate late design changes. These resources are documented in the LSAR E, E1, E2, F, and G Records. It provides input to Subtask 401.2.6 - Management Plans; and Tasks 402 - Early Fielding Analysis and 501 - Supportability Test, Evaluation, and Verification.

Subtask 401.2.4 - Training Requirements and Recommendations. The purpose of this subtask is to identify training requirements and a method for providing the training. It must consider the task procedures, and manning and skill levels required to support the new system and equipment.

Input.

During this phase, input to this task is derived from Subtasks 401.2.1 - Task Analysis and 401.2.2 - Analysis Documentation.

Output.

Some updating may be required during the Production Phase to accommodate engineering changes. This data is documented in the LSAR D1 and G Records. It feeds Subtasks 402 - Early Fielding Analysis and 501 - Supportability Test, Evaluation, and Verification.

Subtask 401.2.5 - Design Improvements. The purpose of this subtask is to determine which operations and/or maintenance tasks fail to meet established goals. It should be performed by both the Navy and the contractor because it verifies the supportability and supportability related design goals previously established by Task 205 - Supportability Related Design Factors.

Input.

During this phase, input to this subtask is derived from Task 205 - Supportability Related Design Factors.

Output.

Some updating may be required during the Production Phase to accommodate late design changes. This data is documented in the LSAR D1 and G Records. It feeds Task 303 - Evaluation of Alternatives and Tradeoff Analysis.

Subtask 401.2.6 - Management Plans. The purpose of this subtask is to identify any action which might be taken to lessen the risks associated with new or critical logistics resources.

Input.

During this phase, input to this subtask is derived from Subtask 401.2.3 - New/Critical Support Resources.

Output.

Initial performance of this subtask is completed during this FSD Phase. Some updating may be required during the Production Phase to accommodate design changes. This subtask provides input to Task 303 - Evaluation of Alternatives and Tradeoff Analysis.

Subtask 401.2.7 - Transportability Analysis. This subtask was completed during the Demonstration and Validation Phase. Additional effort on this subtask during this phase requires considerable interpretation of intent to be cost effective.

Subtask 401.2.8 - Provisioning Requirements. The purpose of this subtask is to satisfy the requirement of DoD Instruction 4151.7 entitled "Uniform Technical Documentation for Use in Provisioning of End Items of Material." This instruction states that all provisioning will be accomplished using the LSAR. **NOTE** There is still some question as to how the provisioning information is to be delivered. Final procedures for Provisioning Technical Documentation (PTD)

delivery will be established upon receipt of guidance from McDonnell Douglas.

Input.

During this phase, input to this subtask is derived from the engineering drawings, R&M characteristics, and the individual Logistics Element specialists from areas such as packaging, pricing cataloging and technical publications.

Output.

Initial performance of this task is completed during this phase. Update will undoubtedly be required during the Production Phase to accommodate Design Change Notice (DCN) activity. This subtask provides all of the technical information, less the engineering drawings, to satisfy the PTD delivery requirements. This information forms the basis for spares procurement during production and is an input to Tasks 402 -Early Fielding Analysis and 501 Supportability Test, Evaluation, and Verification.

Subtask 401.2.9 - Validation. The purpose of this subtask is to validate the LSAR documentation. Validation is accomplished through a combination of on-going internal review by the Performing activity, periodic review by the Requiring Authority and through feedback of the testing and demonstration efforts. Where possible, the LSAR information should be made available to the Requiring Authority reviewing activities via a remote access capability to minimize time spent on-site and to ensure that they always have access to the most current information to support their in-house activities.

Input.

During this phase, there is no input as such because the purpose of this subtask is to confirm the validity of the LSAR data base.

Output.

Performance of this subtask is complted during this phase. Update will be required during the Production Phase to accommodate design changes. The result of this subtask is confirmation of the validity of the LSAR data base and the indirect validation of the technical products developed form the LSAR source information.

Subtask 401.2.10 - ILS Output Products. The product of this subtask is the LSAR output reports based upon the developing LSAR data base. These LSA reports or source information should be coordinated among all ILS element managers to ensure that the ILS program for the new system are developed in an orderly, timely and consistent manner.

Input.

During this phase, input to this subtask is derived from the LSAR.

Output.

Performance of this subtask is completed during this phase. Update
will be required during the Production Phase to accommodate design
changes. Data from this subtask is an input to Tasks 402 - Early
Fielding Analysis and 501 - Supportability Test, Evaluation, and
Verification.

Subtask 401.2.11 - LSAR Updates. The development of the LSAR is an
ongoing effort, becoming more complete and detailed as the new system
and support system designs evolve and mature. It is, however,
necessary to use the LSAR data as it evolves. This, in turn, requires
updating the data as the LSA process continues to ensure the latest
information is available to all ILS element managers and decision
makers.

Input.

During this phase, input to this subtask is derived from the
iterative nature of the LSA process. For example, as new LSA data is
developed due to evolving design of the new system, the LSAR must be
updated to reflect the latest status of the particular ILS element
analysis.

Output.

Performance of this task is completed during the FSD Phase with the
exception of updates that will be required to incorporate Design
Change Notice activity. This information will further be used to
update the logistics products which were initially developed from the
LSAR documentation by feeding the change information back into
subtask 401.2.10 ILS Output Products.

b. Task 402 - Early Fielding Analysis.

Definition.

The purpose of this task is to determine the effect the introduction
of the new system on the existing support infrastructure. It
provides an early assessment of support problems which are likely to
be encountered.

This task, which is started in FSD takes the support system as
designed and compares it to the capabilities of the existing support
organizations. It involves the following four (4) subtasks:

   o Subtask 402.2.1 - New System Impact

   o Subtask 402.2.2 - Sources of Manpower and Personnel Skills

   o Subtask 402.2.3 - Impact of Resource Shortfalls

   o Subtask 402.2.5 - Plans for Problem Resolution

Subtask Procedures.

Subtask 402.2.1 - New System Impact. The purpose of this subtask is to outline the impact of the new system on operating locations and the logistics infrastructure.

Input.

Input to this subtask is derived from the LSAR data base and Government information concerning manpower and personnel and support item resources.

Output.

Performance of this task is started during this phase and completed during production when all design changes have been incorporated. The output of this subtask highlights actions required to minimize adverse impact on the logistics infrastructure created by the new system. For example, design changes may be required to improve reliability and maintainability so as to reduce logistics requirements.

Subtask 402.2.2 - Sources of Manpower and Personnel Skills. The purpose of this subtask is to compare the proposed new system manpower and personnel requirements to those likely to be available at the time the system is placed into operation.
Input.

The major input to this subtask is derived from the LSAR data base and Government information concerning projected manpower and personnel resources.

Output.

Performance of this subtask is started during this phase and completed during the Production Phase once all design changes have been addressed and the LSAR information updated. The output of this subtask is to identify sources of manpower, and personnel skills, and to minimize adverse impact on this resource created by the introduction of the new system into the operational environment. For example, if a shortage of certain skills is identified, it may be necessary to increase recruiting and/or conduct additional on-the-job training to overcome the shortage.

Subtask 402.2.3 - Impact of Resource Shortfalls. The purpose of this subtask is to assess the impact of support resources shortfalls on system availability. This assessment can be made through several means. For example, (1) Subtask 303.2.4 - Sensitivities, (2) modeling using tools such as Availability Centered Inventory Model (ACIM), (3) relating support resource budgets to system availability, etc. This subtask provides the quantitative basis for the development of budget requirements.

Input.

Input to this subtask is derived from Subtask 303.2.4 -
Sensitivities, and the use of existing modeling techniques such as
ACIM, sparing to availability to name a few.

Output.

Performance of this subtask is started in this phase and completed in
the Production Phase to accommodate design changes. This subtask
shows the effect on system availability for varying levels of support
resources and provides the basis for budget requirements.

Subtask 402.2.5 - Plans for Problem Resolution. This subtask is
concerned with routine management actions required to develop plans
designed to correct the deficiencies identified by the previous
subtasks.

Input:

There is no input, as such, to this subtask in that it requires
development of solutions to problems uncovered earlier.

Output.

Performance of this subtask is started during this phase and updated
in the Production Phase to accommodate design changes. This subtask
provides the plans for resolution of problems discovered in the
previous efforts.

4.2.4.4 Production and Deployment

a. Task 401, Task Analysis.

During the Production and Deployment phase the critical issue is the
recognition that all support planning is subject to change for a host
of reasons. Therefore, it is mandatory that the LSA community stay
intimately involved with Manufacturing Engineering to track and
assess the impact of proposed engineering changes and that field
feedback is assessed for indications that support decisions may
require reassessment and shifts in established support concepts.
Issues such as technological and economic life may require
re-analysis of previously established repair vs. discard decisions,
the introduction of new technologies or the elimination of vendor
sourcing may alter support concepts.

Subtask 401.2.11 - LSAR Updates. The maintenance of the LSAR is a
life cycle management issue. The utility of an LSAR degrades rapidly
if not maintained with the most current information. It is, however,
necessary to use the LSAR data as it evolves. This, in turn,
requires updating the data as the LSA process continues to ensure the
latest information is available to all ILS element managers and
decision makers.

Input.

During this phase, input to this subtask is derived from the
iterative nature of the LSA process. For example, as new LSA data is
developed due to evolving design of the new system, the LSAR must be
updated to reflect the latest status of the particular ILS element
analysis.

Output.

Performance of this task is completed during the FSD Phase with the
exception of updates that will be required to incorporate Design
Change Notice activity. This information will further be used to
update the logistics products which were initially developed from the
LSAR documentation by feeding the change information back into
subtask 401.2.10 ILS Output Products.

b.   Task 402 - Early Fielding Analysis.

Definition.

The purpose of this task in this phase is to update the assessments
of fielding and is to refine the identified effects associated with
the introduction of the new system on the support infrastructure. It
provides critical information to counter anticipated support
problems.

This task, which was started in FSD takes the support system as
designed and compares it to the capabilities of the existing support
organizations. The updates involve the same four (4) subtasks as
identified under FSD.

c.   Task 403 - Post Production Support Analysis

Definition.

The purpose of this task is to determine what is required to ensure
that the new system will be supportable after initiation of
production deliveries. This is accomplished by updating the
information developed during the FSD phase. This task, which is
started in FSD and completed during the Production Phase, is composed
of one (1) subtask, which is Subtask 403.2 Post Production Support
Plan (DI-P-711͡).

Subtask Procedures.

Subtask 403.2 - Post Production Support Plan. The purpose of this
subtask is to develop a plan for implementing effective solutions to
post-production support problems for the new system. The plan should
consider such matters as vendor sourcing, modifications to allow
incorporation of new technologies, system availability objectives,
service life extension, economic life, etc.

Input.

Input to this subtask is derived from Task 402 - Early Fielding

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Analysis, Subtask 501.2.4 - Post Deployment Assessment Plan, Pre-Planned Product Improvement, data rights, etc. This subtask also should be accomplished in concert with Subtask 501.2.5 - Post Deployment Supportability Assessment.

Output.

Performance of this subtask is started and completed as early as possible in the Production Phase. The result of this effort is a plan of action and the associated funding requirements to minimize post-production support problems for the new system.

4.2.5 Task Section 500, Supportability Assessment.

The supportability assessment made under the 500 series Tasks are used to test and evaluate the new system design concepts or designs at various stages in the hardware development to determine if specified supportability requirements are being met and the degree to which they are being achieved. Any shortcomings are identified and corrective measures are developed. Supportability data from Test and Evaluation (T&E) and operational performance reporting aid in this assessment and the formulation of corrective actions.

4.2.5.1 Concept Exploration

a. Task 501 - Supportability Test, Evaluation and Verification

Definition.

Task 501 determines the degree to which supportability goals have been met and deficiencies have been corrected. Unlike the more traditional approach to testing, this Task includes test and evaluation of the support system performance. It is comprised of generally two (2) areas of supportability.assessment: (1) assessment as part of the formal Test and Evaluation (T&E) program, and (2) assessment after deployment through analysis of operational, maintenance, and supply data on the system in its operational environment. It includes the performance of the following five (5) subtasks:

o Subtask 501.2.1 - Test and Evaluation Strategy

o Subtask 501.2.2 - Objectives and Criteria

o Subtask 501.2.3 - Updates ant Corrective Actions

o Subtask 501.2.4 - Supportability Assessment Plan (Post Deployment)

o Subtask 501.2.5 - Supportability Assessment (Post Deployment) Subtask Procedures.

Subtask 501.2.1 - Test and Evaluation Strategy. The purpose of this

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subtask is to develop the supportability test and evaluation planning. This includes providing a basis for the development of test and evaluation plans for DEM/VAL, FSD testing and Follow-on Test and Evaluation (FOT&E). T&E strategies must reflect the established supportability and supportability related design requirements; supportability cost, and operational availability drivers; and areas associated with a high degree of risk.

Input.

During this phase input to this subtask is obtained from Tasks 203 - Comparative Analysis, 205 - Supportability Design Factors, and 303 Evaluation of Alternative Tradeoff Analysis which provide information on supportability drivers, past problem areas, and major areas of supportability risks.

Output.

Performance of this subtask continues into DEM/VAL and provides the basis for development of the T&E plans for supportability testing of the new system.

4.2.5.2   Demonstration and Validation

a.   Task 501 - Supportability Test, Evaluation, and Verification

This task was initiated during the CE. However, only Subtask 501.2.1 - Test and Evaluation Strategy was required to be performed during that phase. Performance of this task during DEM/VAL consists of updating, refining, and completing Subtask 501.2.1 - Test and Evaluation Strategy; and initiating Subtasks 501.2.2 - Objectives and Criteria and 501.2.3 - Updates and Corrective Actions. The remaining two (2) subtasks 501.2.4 - Supportability Assessment Plan (Post Production) and 501.2.5 - Supportability Assessment (Post Production) will be started in FSD and Production, respectively.

Subtask Procedures.

Subtask 501.2.1 - Test and Evaluation Strategy. As stated above, during DEM/VAL performance of this subtask consists of updating, refining, and completing the T&E strategy using the latest data as the new system program matures.

Input.

During this phase, input to this subtask is derived from updated Tasks 203 - Comparative Analysis, 205 - Supportability Design Factors, and 303 - Evaluation of Alternative Tradeoff Analysis.

Output.

Performance of this subtask could, in part, continue into the FSD phase; however, it should be completed now to provide a firm basis for the development of T&E plans for DEM/VAL and FSD of the

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supportability T&E program for the new system.

Subtask 501.2.2 - Objectives and Criteria. The purpose of this subtask is to establish test plans and criteria based on the T&E objectives of the new system. An important element is the identification of ILS support to be provided to the testing activities.

Input.

During this phase, input to this subtask is derived from Tasks 301 - Functional Requirements Identification, 303 -Evaluation of Alternatives and Trade and 401 - Task Analysis.

Output.

Performance of this subtask continues into FSD and results in detailed test plans for the new system.

Subtask 501.2.3 - Updates and Corrective Actions. The purpose of this subtask is to analyze data resulting from testing in order to: (1) correct deficiencies and validate corrective actions; (2) update projections for readiness, O&S costs, and logistics support resource requirements; (3) determine degree of improvement required in supportability to meet established goals; (4) evaluate degree of compliance with contractual requirements; (5) provide assessment of supportability as an input into the material acquisition process; (6) update LSAR data; and (7) provide a data base to be used for comparative analysis on future systems.

Input.

During this phase, input to this subtask is derived from data resulting from contractor testing, development and operational testing, ILS evaluations of contractor achievement, etc.

Output.

Performance of this subtask continues into the FSD Phase with only limited activity in the Production Phase. The results of this effort provided data as outlined in the seven (7) actions delineated above.

4.2.5.3 Full Scale Development.

a. Task 501 - Supportabiltiy Test, Evaluation, and Verification

This task was initiated during CE with performance of Subtask 501.2.1 - Test and Evaluation Strategy which was completed during DEM/VAL. During DEM/VAL, Subtasks 501.2.2 - Objectives and Criteria and 501.2.3 -Updates and Corrective Actions were started. During this phase, Subtasks 501.2.2 - Objectives and Criteria, and 501.2.3 - Updates and Corrective Actions will be essentially completed. The effort during this phase will consist of updating and refining these

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two (2) subtasks in light of the latest data made available as the new system design matures, operational scenario and environment, etc., become refined; and the initiation of Subtask 501.2.4 - Post Deployment Assessment Plan. Procedures for the performance of these FSD subtasks are described below.

Subtask Procedures.

Subtask 501.2.2 - Objectives and Criteria. The test plans and criteria developed during DEM/VAL are updated during this phase. Further, identification of the ILS support to be provided to the test activities is determined.

Input.

During this phase, input to this subtask is derived from updated Tasks 301 - Functional Requirements Identification, 303 - Evaluation of Alter- natives and Tradeoff Analysis, and 401 - Task Analysis.

Output.

Performance of this subtask is essentially completed during this phase and the results used to update test plans for the new system.

Subtask 501.2.3 - Updates and Corrective Actions. The updates and corrective actions started during the preceding phase are refined and completed during this phase. Completion of the six (6) actions under this subtask (defined in the DEM/VAL Phase for this subtask) will minimize problems of supportability for the new system as it enters the Production Phase.

Input.

During this phase, input to this subtask is derived from updated (since the DEM/VAL Phase input) contractor testing, development and operational testing, ILS evaluation of contractor achievement, etc.

Output.

Performance of this subtask is completed in this phase. The results of this effort provide completed data on the six (6) actions under this subtask which were defined in DEM/VAL for this subtask.

Subtask 501.2.4 - Post Deployment Assessment Plan. The purpose of this subtask is to develop an assessment approach which will provide the necessary data, and accuracy of data, to conduct an analysis. Care must be exercised to assure that the data collected is from field operations, rather than an activity which is receiving special attention, e.g., contractor support personnel, special supply procedures, extra support equipment, etc. In the event existing standard field reporting systems will not provide the data to conduct an analysis, then a supplemental data collection program must be planned, approved, budgeted for, and implemented.

Input.

During this phase, input to this subtask is derived from Tasks 203 -
Comparative Analysis, 205 - Supportability and Supportability Related
Design Factors, and 303 - Evaluation of Alternatives and Tradeoff
Analysis.

Output.

Performance of this subtask is essentially completed during this
phase. It is possible some updating may be required during the early
part of the Production Phase. Completion of this effort results in a
plan for assessing the degree to which supportability goals are being
achieved and to identify any shortfalls.

4.2.5.4 Production.

a. Task 501 - Supportability Test, Evaluation, and Verification

With the possible exception of some minor updating, all subtasks
except Subtask 501.2.5 - Post Deployment Supportability Assessment
were basically completed by the end of the Full Scale Development
(FSD) Phase. The effort during this phase will consist of completing
Subtask 501.2.5 - Post Deployment Supportability Assessment.

Subtask Procedures.

Subtask 501.2.5 - Post Deployment Supportability Assessment.
Performance of this assessment can provide significant information
for system/equipment enhancements through logistics support resource
modifications, product improvement programs, modification of
operating programs, etc. In addition, comparative analysis of field
results, test and evaluation results, and engineering analysis can
provide information to better project supportability, cost, and
availability parameters on future acquisition programs.

Input.

Input to this subtask is derived from field reporting systems and
special reporting requirements established by Subtask 501.2.4 - Post
Deployment Assessment Plan, ILS evaluations of contractor
performance, etc.

Output.

Performance of this subtask is completed during this phase. This
effort defines the degree to which supportability goals and
parameters have been met and provides visibility of those areas
requiring corrective action. Results of this effort should be used
to update Subtask 403.2 - Post Production Support Plan.

5.0 LSAR Documentation Procedures.

The detailed entry instructions for documentation of LSAR data are contained in Appendix A of this guide. They represent a tailored implementation of MIL-STD-1388-2A, DoD Requirements for a Logistic Support Analysis Record. They have been modified as required to support the Navy Sinformation requirements as reflected in the LDIP and LSAPR documents. These procedures will be updated based upon changes and refinements in the Navy documentation needs.

The RMS LSAR is captured in an automated LSAR using the MRSA ADP system. This system has demonstrated its capability to generate LSAR Master Files which are compatible with the U.S. NAVY'S "Class II" LSAR ADP system. It is envisioned that NAVSEA will likely impose or suggest additional automated capabilities as their sophistication with the LSAR evolves. The (T3D) software offers significant import, processing and output capabilities that can easily be adapted to new interfaces, processing and reporting requirements. Figure 5-1 identifies the major segments of the RMS LSAR ADP system.
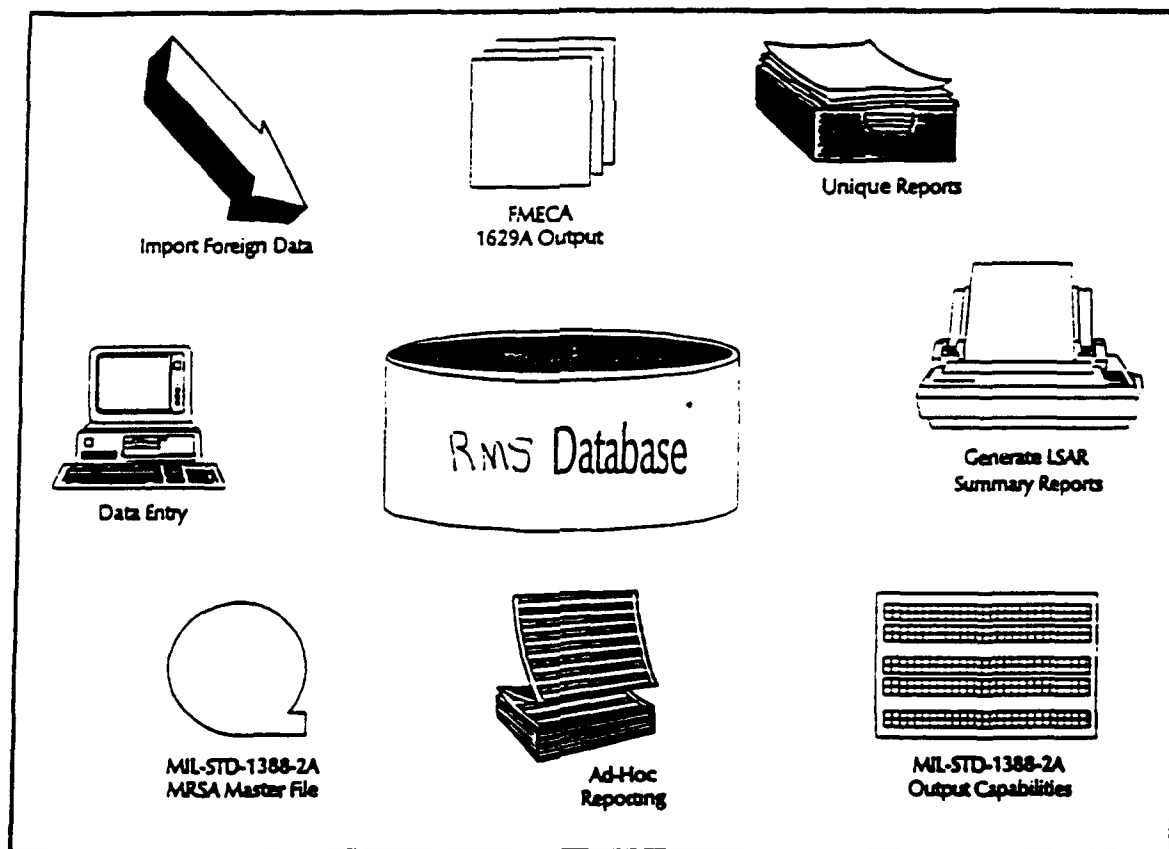

Import Foreign Data

FMECA
1629A Output

Unique Reports

Data Entry

RMS Database

Generate LSAR
Summary Reports

MIL-STD-1388-2A
MRSA Master File

Ad-Hoc
Reporting

MIL-STD-1388-2A
Output Capabilities

Figure 5-1. RMS **LSAR ADP System.**

subcontractors are currently in the process of demonstrating the compatibility with the   database. A reverse demonstration is planned to ensure that all subcontractors can import LSAR information from GE/GCSD in order to eliminate the re-generation of existing documentation.

5.1 LSAR Documentation Flow.

The development of the RMS LSAR database represents the combined efforts of the Design, Systems Engineering and ILS functional communities of The NCSC.   Although the LSA Program portion of the ILS Program has cognizance over the LSAR development, the ultimate quality of the LSAR information is directly dependent upon the committment, by all participating organizations, to it quality, currency and accuracy. Detailed in the following paragraphs are the functional area responsibilities for the generation of the inputs to the LSAR database.

The RMS hardware design requirements are initially established by the system specification developed by the government. These requirements specify system level requirements and constraints representing a combination of hardware and support system performance characteristics. These requirements are further defined to establish specific requirements or objectives for each Supportability-related program element. Under   approach, Front End Analysis is used to ensure that support related considerations such as manpower and personnel, testability, standardization and transportability, to name just a few, are included in the design definition process.

All Front End analyses are conducted in advance or concurrent with the evolution of the hardware design to ensure that the RMSDB provides, not only the necessary performance, but is also supportable and affordable in the operational environment.
Accomplishment of the Front End analyses is divided between the R&M, Human Factors Engineering, Testability and LSA communities. The analyses consist of trade studie of design concepts and alternatives for both the hardware/software and support system. The results establish hardware/software and support system design requirements and constraints providing the best balance of hardware performance and support considerations.

The R&M element is lead in the conduct of SE/ILS-related program trade studies. R&M assesses inherent Reliability and Maintainability characteristics of each alternative. The Human Factors Engineering community compliments these activities through the identification of manpower and personnel constraints, deficiencies in human factors characteristics and potential health hazard and safety considerations. The Integrated Diagnostics/Testability organization establish testability characteristics necessary to achieve the required diagnostic capabilities. LSA community assess each alternative to ascertain operations and maintenance requirements to include the identification of individual support resource requirements and Operations and Support (O&S) costs.

The combined results are used for selection or identification of preferred design alternatives for feedback to the design community.

As proposed designs are formulated by Design Engineering they are reviewed and analyzed by the Participating organizations. The review and analysis serves to: (1) verify achievement of objectives, and; (2) initiate the support system development activities. This involves each of the Participating organizations elements.

The design information during initial design phase consists of preliminary designs. Through the iterative process of analysis, evaluation and feedback by SE/ILS and other Systems Engineering disciplines these preliminary designs were continually refined and updated. The level of analysis was directly related to the status of the design information. During the advanced development program the RmS design will be completed and the support-related information documented in the LSAR portion of the RmSDB database. The following paragraphs describe the role of the individual Participating organizations elements in the conduct of the design analysis portion of the LSA process.

Reliability & Maintainability (R&M)

R&M provides the primary interface of the participating organizations with the Design Engineering community. They are responsible for the initial SE/ILS analysis of the design to determine whether or not the design supports attainment of system R&M requirements. The characteristics are identified and quantified as described in the Reliability Process Requirements document. The LSAR database is updated with R&M data by LSA program element using the documentation procedures contained in the LSA Implementation Guide. The R&M design information is translated into the LSAR documentation format so that it is available to all participating organizations elements through the established RmSDB interface. Under this approach the LSAR serves as an evolving baseline database that is continually updated to the most current design configuration.

R&M is responsible for generation of the R&M characteristics contained in LSAR database. Specifically, they are responsible for: (1) Quantifying hardware R&M characteristics of the design, with assistance from LSA, in a top-down hardware generation breakdown of the system, and; (2) Input of the LSAR B/B1/B2 Records.

The LSAR B Record contains descriptive information relative to an item's physical location within the system breakdown, its function, any qualitative Maintainability characteristics and quantitative R&M parameters. The quantitative R&M parameters reflect the allocations required to meet established requirements and constraints. As the design matures the allocations are updated with predicted values and finally measured values based upon FSD R&M demonstrations and test results.

R&M conducts a Failure Modes and Effects Analysis (FMEA). The FMEA

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identifies the manner in which an item can fail and forms the basis for the Maintenance Planning process to be conducted by the LSA element of the ILS program. R&M documents the FMEA results on the LSAR B1 Record and updates the B Record R&M characteristics predictions. This documentation is accomplished in accordance with the approved LSAR Documentation Procedures Guide.

Designs which fail to meet established requirements are identified back to the Design Engineering community for resolution and are not further analyzed within the Participating organizations. Those designs which satisfy established requirements and constraints are made available through the RMSDB database to the Human Factors Engineering, Integrated Diagnostics and Testability and ILS functional communities.

As the design evolves, R&M updates the FMEA information until a complete set of FMEA data has been developed for each potentially repairable item in the hardware breakdown. The Maintainability Information analysis marries up a corrective maintenance action to each identified failure mode contained in the FMEA data. The end result is a set of corrective maintenance requirements for each potentially repairable item within the complete system breakdown.

As deficiencies in the hardware/software and support system designs are identified through analysis by the other SE/ILS-related program elements the results are communicated back to the R&M community for review and concurrence. Collective recommendations are developed and provided back to the design community for further consideration and resolution.

Integrated Diagnostics/Testability

The Integrated Diagnostic/Testability engineers use the FMEA information to establish testability characteristics of the system. They conduct analyses to determine the capabilities of the Built-In-Test (BIT) of individual components and of the total system. They review and evaluate the adequacy of component test points and sensor placement. This information is documented in the LSAR in the BIT Application, Logistics Considerations and Maintainability Characteristics data fields. Diagnostic fault trees, developed using FMEA information and automated Test Program Set (TPS) design tools, are prepared. This information is used to evaluate the on-board Fault Detection and Isolation System (FDIS) and the Fault Isolation procedures to be included in the maintenance procedures. The Diagnostic engineers identify specific TPS requirements to include the individual test programs, test program instructions and the interconnecting devices for each identified Unit Under Test (UUT). This information is documented in the LSAR on the B/B1,C,D/D1, and E/E2 Records.

Logistic Support Analysis

The LSA community initiates the Maintenance Planning portion of the ILS program. Using the R&M information contained in the LSAR, the LSA program performs two key analyses. The first is the Level of Repair

Analysis (LORA). The LORA is accomplished using the approved EDCAS model and consists of a detailed analysis to make a Repair versus Discard decision for each potentially repairable item. If it is determined that the item can be repaired economically, then the EDCAS provides a recommendation for the level of maintenance at which the repair should be accomplished.

Those selected for discard at failure are not further analyzed and are treated as non-repairable components of their immediate next higher assembly. No tasks are written against these items.

Items selected for repair are identified as reparables and are subjected to a detailed Task Analysis for each of the identified corrective actions indicated by the FMEA information. Items selected for repair at failure are documented in the LSAR on an LSAR C Record by the LSA community prepares. The C Record identifies each separate corrective action to be accomplished against a reparable item.
The second analysis performed by the LSA community is the Reliability Centered Maintenance (RCM) analysis. The RCM analysis is a decision logic which builds upon the FMEA data provided by R&M. Through the RCM process all preventive or scheduled maintenance actions are identified. The RCM logic results are documented by the LSA community on the B Record. Each scheduled maintenance task for an item is added to the C Record for that item. The combination of the LORA and RCM analyzes identifies all of the corrective and preventive maintenance requirements for each assembly.

In addition to the corrective and preventive actions, the LSA community is responsible for the conduct of analyses of the system operations to identify "other" support tasks. These tasks include actions such as mission profile changes, transport preparation, depot classification and screening and fault location requirements. They are identified through the analysis of C&TS operations using established NAVY procedures. In addition to those support tasks identified through analysis of planned field operations, support tasks based upon an analysis of depot operations obtained through the Depot Study are also identified. These tasks are consolidated on the LSAR C Records for the items to which they pertain. At this point the completed C Record for an item contains all of the operations and maintenance tasks that must be accommodated by the support system and identifies the anticipated frequency per year of normal operations for each.

Integrated Logistic Support (ILS)

For each task identified against an item, the Maintainability/LSA communities conducts a Task Analysis. The initial Task Analysis conducted by Maintainability consists of the basic actions or procedural steps to be accomplished in performance of the task. Maintainability/LSA communities identify individual support resource requirements for each task. The LSA community, supported by the individual ILS functional elements and other SE/ILS-related program elements, further analyze the task requirements. They are documented in the LSAR on the D and D1 Records and through the RMSDB this information is reviewed by the subject matter experts (SMEs) from the

R&M, Training and ILS functional disciplines.

The Technical Publications community uses the task analysis information as source data for development of the technical publications. They apply target audience considerations such as reading grade levels, task environment, hardware sensitivity to incorrect performance, as well as, safety and health hazard conditions. The refined the task descriptions include all notes, cautions and warnings to be included in the individual publications. The task descriptions contained in the LSAR are being used to provide technical publication narrative data base and are transferred to the automated authoring system electronically.

Support Equipment engineers evaluate the task based upon support equipment requirements and select the appropriate items to be used. The Support Equipment engineers coordinate the Diagnostic personnel define procedures for using Test Program Sets (TPSs) in conjunction with the use of Automatic Test Equipment (ATE).

Facilities engineering reviews the tasks to determine new or modified facility requirements. The Depot Study and site surveys of operational sites provide the baseline for this identification. New or modified facility requirements are documented by the Facilities engineer on the LSAR F Record.

The Training community assigns individual personnel responsibilities for performance of each task documented in the LSAR. Based upon the personnel assignments made by the Training community for each task, a personnel and skill analysis will be conducted. The results of the training analysis are documented on the D1 Record for the task and provide an assessment regarding the adequacy of the assigned personnel skill to perform the task. In addition, based upon frequency of performance or consequences of inadequate performance, a training recommendation is established for each task. This information forms the basis for development of the training programs. Requirements for modification of formal service training school programs of instruction, the programs which result in an individual's personnel skill identifier are further defined and justified on the LSAR G Record.

When the Support Equipment Engineer identifies the requirements for a new or peculiar piece of support equipment, then they complete an LSAR E and E1 Record. In the event the E and E1 Record represents an item of Automatic Test Equipment, then an E2 Record is prepared for each item of the system or Unit Under Test (UUT) that will be tested using the piece of ATE. The Support Equipment Engineering is assisted in the preparation of the E Records for ATE by the Diagnostic engineers in identifying the specific TPS requirements to test each designated UUT.

The Supply Support community uses the results of the Task Analysis to identify spare and repair parts requirements, quantities and stockage distribution. This information is contained on the LSAR D1 Record (D07 Card). The Provisioning element of the Supply Support functional area complete the LSAR H and H1 Records for the complete system breakdown. When coupled with the approved engineering drawings and the Supplemental Provisioning Technical Documentation (SPTD), the

LSAR H and H1 Record information provides all of the information requirements for Provisioning Technical Documentation (PTD).

Working in consonance with the Provisioning community, the Technical Publications community assists in the development of the H1 Records. Their inputs are used to define the requirements for the Repair Parts/Special Tools List (RPSTL) information to be included in the Parts Manuals. The Depot activation element of Supply Support area use the LSAR documentation to establish the Depot tooling and parts stockage needed to support the pilot Depot Rework and Overhaul program. The packaging requirements for each hardware item is developed by the packaging engineering community. This data is added to the previously established LSAR H records.

Based upon the identified shuttle launch and load limitations the Transportatability community define the transportability engineering characteristics of the RMS component and replenishment spares in their shipping configuration. This information is documented on the LSAR J Record. Major items shipped unsectionalized will have a single J Record. If sectionalized for transport, a separate J Record will be prepared for each section.

Human Factors Engineering

The Human Factors Engineering community, as previously discussed, is heavily involved in the Front End Analysis portion of the process. As specific tasks are identified the Human Factors Engineering community serves as a reviewing activity of the maintenance planning and training requirements results. Personnel task assignments are reviewed by means of the $RMSDB$ interface to identify opportunities for personnel skill consolidation and reductions in manpower levels. Tasks are reviewed for identification of potential or real safety and health hazard conditions in the performance of all operations and maintenance task requirements.